SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
Bulletin 144

THE AMERICAN BATS OF THE GENERA MYOTIS AND PIZONYX

BY

GERRIT S. MILLER, Jr.
Curator, Division of Mammals, United States National Museum

AND

GLOVER M. ALLEN
Curator of Mammals, Museum of Comparative Zoology
Cambridge, Massachusetts

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The scientific publications of the National Museum include two series, known, respectively, as *Proceedings* and *Bulletin.*

The *Proceedings*, begun in 1878, is intended primarily as a medium for the publication of original papers, based on the collections of the National Museum, that set forth newly acquired facts in biology, anthropology, and geology, with descriptions of new forms and revisions of limited groups. Copies of each paper, in pamphlet form, are distributed as published to libraries and scientific organizations and to specialists and others interested in the different subjects. The dates at which these separate papers are published are recorded in the table of contents of each of the volumes.

The *Bulletin*, the first of which was issued in 1875, consists of a series of separate publications comprising monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal works, reports of expeditions, catalogues of type-specimens, special collections, and other material of similar nature. The majority of the volumes are octavo in size, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable. In the *Bulletin* series appear volumes under the heading *Contributions from the United States National Herbarium*, in octavo form, published by the National Museum since 1902, which contain papers relating to the botanical collections of the Museum.

The present work forms No. 144 of the *Bulletin* series.

Alexander Wetmore,
Assistant Secretary, Smithsonian Institution.

Washington, D. C., *April 18, 1928.*

PREFATORY NOTE

The revision of the American bats of the Genus *Myotis* was originally begun by the senior author alone. A preliminary review was made by him on the basis of the available material in the United States National Museum (including the collections of the Bureau of Biological Survey, United States Department of Agriculture), the Field Museum of Natural History, and the British Museum (Natural History). On account of the pressure of other duties, however, he was unable to bring the study to completion. The notes and material were then placed in the hands of the junior author who took up the revision *ab initio* and prepared a complete draft of the general account of the species. Later, by conference and correspondence, the more difficult aspects of the subject were jointly considered and all divergencies of opinion were thus reduced to a basis of mutual accord. The monograph in its present form sets forth the final results of all this work.

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INTRODUCTION

The bats of the genus *Myotis*, though small and inconspicuous mammals, present many features of unusual interest from the point of view of systematic zoology. At nearly every point in its excessively wide range the genus is represented by several species often puzzlingly alike in superficial appearance though readily distinguishable from each other when the true differential characters are once recognized. As these animals everywhere subsist, so far as known, on small, soft-bodied insects, and their habits appear to be subject to no conspicuous changes from species to species or from district to district, we are forced to regard the process of specific differentiation in the group as a whole as primarily dependent on some other factor than any influence which might be exercised directly by the environment. This is equally true of the species in most genera of bats; but in no other genus do we find the process worked out in so much variety of detail over a territory so nearly world-wide in extent.

In striking contrast to *Myotis* the nearly related genus *Pizonyx* is not at present known to have any geographical "range" in the true sense, as the few existing specimens have all been collected on islets in the Gulf of California and on the neighboring mainland of Sonora. Its peculiarities may prove to have an adaptational significance as the animal has become specialized in a manner which somewhat parallels the occasionally fish-eating *Noctilio*. The food habits are, however, not yet known.

MATERIAL AND ACKNOWLEDGMENTS

When the North American Vespertilionidae were reviewed by Miller, 30 years ago,[1] the available collections, though much better than any previously studied, were still far from sufficient to elucidate many of the questions as to distribution and relationship of the members of the genus *Myotis*, 1,322 specimens of which were then enumerated. These were referred to 16 forms. The material on which the present study of this genus is based is much more abundant and well prepared than has ever before been brought together. From North America we have been able to list no less than 4,504 specimens, representing 34 forms. So far as this region is concerned we probably have now a fairly adequate knowledge of practically all the species of *Myotis*, though much work remains to be done on the subject of local races and the exact limits of ranges. With regard to South America the subject is in a less satisfactory state; but it is sufficiently far advanced to make us believe that, for the neotropical species, we have at least a good general picture which later may be filled in with more detail. We have examined 970 specimens, referable, in our present opinion, to 12 forms. Of the 5,474 specimens of *Myotis* which have passed through our hands we may say that they represent practically all of the American material available in the larger museums of this continent and a very important series of South American specimens lent by the British Museum.

Acknowledgments are gratefully made to the following persons for the loan of specimens belonging to them or in their charge: Mr. H. E. Anthony, of the American Museum of Natural History, New York; Prof. C. D. Bunker, Kansas University Museum of Natural History, Lawrence, Kans.; Prof. Manton Copeland, Bowdoin College, Brunswick, Me.; Dr. Lee R. Dice, University of Michigan, Ann Arbor, Mich.; Mr. Donald R. Dickey, 514 Lester Avenue, Pasadena, Calif.; Dr. Joseph Grinnell of the Museum of Vertebrate Zoology, University of California, Berkeley, Calif.; Mr. Samuel Henshaw, director of the Museum of Comparative Zoology, Cambridge, Mass.; Miss Mary E. McLellan, California Academy of Sciences, San Francisco, Calif.; Dr. Wilfred H. Osgood, of the Field Museum of Natural History, Chicago, Ill.; Dr. Witmer Stone and Mr. Wharton Huber, of the Academy of Natural Sciences of Philadelphia, Pa.; and Mr. Oldfield Thomas, of the British Museum (Natural History), London, England. The collection of the Academy of Natural Sciences of Philadelphia contains the types of several of Harrison Allen's species; that of the American Museum includes a number of types of both North American and South American forms; while that of

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[1] North Amer. Fauna, No. 13, Oct. 16, 1897.

the University of California is especially rich in series of west coast specimens. Finally, particular mention should be made of the usefulness of the South American material belonging to the British Museum.

For the preparation of the maps we are indebted to the courtesy of the Biological Survey, United States Department of Agriculture.

ABBREVIATIONS AND MEASUREMENTS

The following abbreviations are used, in the lists of specimens examined and the tables of measurements, to indicate the several institutions of whose collections the material forms a part:

A. M. N. H.—American Museum of Natural History, New York City.
A. N. S. P.—Academy of Natural Sciences of Philadelphia, Pa.
B. M.—British Museum (Natural History), London, England.
C. A.—California Academy of Sciences, San Francisco, Calif.
F. M.—Field Museum of Natural History, Chicago, Ill.
K. U.—Kansas University Museum of Natural History, Lawrence, Kans.
M. C. Z.—Museum of Comparative Zoology, Cambridge, Mass.
U. C.—Museum of Vertebrate Zoology, University of California, Berkeley, Calif.
U. M.—University of Michigan, Ann Arbor, Mich.
U. S. N. M.—United States National Museum, Washington, D. C.

When no collection is specifically indicated the specimens alluded to are in the National Museum.

Cranial measurements have all been made by the authors. The tables of external measurements have been prepared by Mr. H. H. Shamel of the National Museum. It is to be understood that, unless there is a specific statement to the contrary, every individual included in the tables of external measurements has the joints of the fingers in adult condition and that every skull has the basal suture closed. Wear of teeth as an index to age is indicated as follows in the tables of cranial measurements: 0=no wear visible; 1=wear just visible but not obvious; 2=wear obvious but not obscuring the structural characters of the upper molars; 3=wear so far progressed as to obscure the structural characters of the upper molars. In measuring skulls the incisors have been excluded from both "greatest length" and "mandible." The "occipital depth" does not include the sagittal crest or the auditory bullae. The teeth rows were measured from front surface of canine to hind surface of posterior molar. Length and breadth of individual teeth were taken with dissecting microscope and eyepiece micrometer. Quotation marks indicate that certain external measurements are given as recorded by the collectors of the specimens. The absence of measurements of the ear shows that the external measurements of a specimen were taken from the dried skin.

DIFFERENTIAL CHARACTERS OF THE AMERICAN SPECIES OF MYOTIS

As the American members of the genus *Myotis* show no excessive developments of structure, the differential characters by which the species may be recognized are not always readily understood. The more important of these characters will therefore be passed briefly in review.

Ear.—The ear is usually about long enough to reach the end of the muzzle when laid forward. In *Myotis volans* it is slightly shortened, but in such species as *M. keenii* (=*M. subulatus* H. Allen and recent authors, not of Say), *M. evotis*, *M. thysanodes*, and *M. chiloënsis*, it is elongated sufficiently to extend rather noticeably beyond the tip of the muzzle. The tragus is of characteristic slender lancet shape, varying little in its proportionate height, which is nearly half that of the ear. While the length of the ear relatively to that of the head is often a very important specific character, we have found the actual form of less value in distinguishing between nearly related members of the genus.

Wing and membranes.—Usually the third to fifth metacarpals and third to fifth fingers are slightly graduated; but in a few species these metacarpals tend to be nearly equal, as are also the fourth and fifth digits. Otherwise we have not found that characters derived from the bony elements of the wing are of much service in determining species. This remark, of course, is not intended to allude to the actual lengths of forearms and of digits, as these measurements are very significant.

The point of attachment of the wing membrane to the lower limb, a feature of importance in the Old World members of the genus, is a character which does not contribute much to the determination of American species of *Myotis*. In all of these except the North American *M. grisescens* and the South American *M. simus* (also *M. pilosus*, if this is actually an American bat; see pp. 25, 208) the membrane is inserted on the side of the foot near the base of the phalanges; in *M. grisescens* and *M. simus* the point of insertion is at the ankle. While the type of insertion thus remains surprisingly constant in the American species of *Myotis*, a very peculiar condition has been developed in *Pizonyx* (see p. 33).

Foot.—The length of the foot relatively to that of the tibia varies much both individually and from species to species. When a few specimens of one kind are measured the variations in ratio of foot length to tibia length will be found to group themselves about a mean which is an important specific character. In the American species the means of this ratio range from about 40 to about 60.

Among the Old World members of the genus there are species in which the foot is more enlarged than in any of those known from America (ratio of foot to tibia rising as high as 64 and 76), the wing attachment is at a point a little above the ankle, and the fur is rather dense and woolly in appearance. The subgeneric name *Leuconoë* has been applied to these bats; and Thomas formally raised the group to generic rank in 1915.[2] The occurrence of various intermediate conditions, however, seems to us to make generic recognition undesirable. Though Thomas has referred *Myotis lucifugus carissima* to the *Leuconoë* group, the nearest approach to this type of bat in America is probably *Myotis grisescens* of the southeastern United States, the American species with the highest ratio of foot to tibia, and one of the two in which the wing membrane comes off from the tarsus instead of from the side of the foot. A large-footed animal resembling *Myotis macrotarsus* of the Philippine Islands has been described under the name *Vespertilio pilosus* from a supposed South American locality. No second specimen of this bat has been taken, and the species must for the present be regarded as doubtfully American.

The presence or absence of a keel on the outer edge of the calcar is a character of importance in the identification of species. This structure is a widening of the long spur that helps to spread the margin of the interfemoral membrane. It is convex in outline, beginning to rise at a distance from the heel equal to about the width of the foot.

Fur and color.—The body is well furred, and the hairy covering usually extends thinly on the under side of the wing to a line joining the knee and the distal half or third of the humerus. In *Myotis volans* it reaches the elbow. In some species there is a fringe of short hairs on the free edge of the interfemoral membrane; this fringe is slightly developed in *M. evotis*, very conspicuously in *M. thysanodes*. Usually the fur is soft and silky, but sometimes, as in the South American *M. simus* and the North American *M. austroriparius*, it assumes a decidedly velvety or woolly texture. The tips of the longer hairs may be burnished and glistening (as in *Myotis lucifugus*) or dull (as in *M. californicus*). When the hairs of the back are smoothly parted two well-contrasted color zones are ordinarily exposed, a darker slaty area involving the bases of all the hairs and a lighter distal area formed by the tips of the shorter hairs and determining the general hue of the upper parts. Occasionally the contrast is not very noticeable, and rarely (as in *M. grisescens* or in forms which have undergone unusual general darkening) it may be essentially absent. Ordinarily the tips of the longer dorsal hairs do not form an obvious third color band; hence the absence of a tricolor pattern is often a convenient character by which to distinguish a *Myotis* from a *Pipistrellus* in parts of America where the two genera occur together. One North American species of *Myotis*, however (*M. sodalis*), has definitely tricolored dorsal fur, but the pattern is not so noticeable as it is in the species of *Pipistrellus* with which the animal is associated. In the pallid desert race of *Myotis californicus* an obvious tricolor pattern is also met with.

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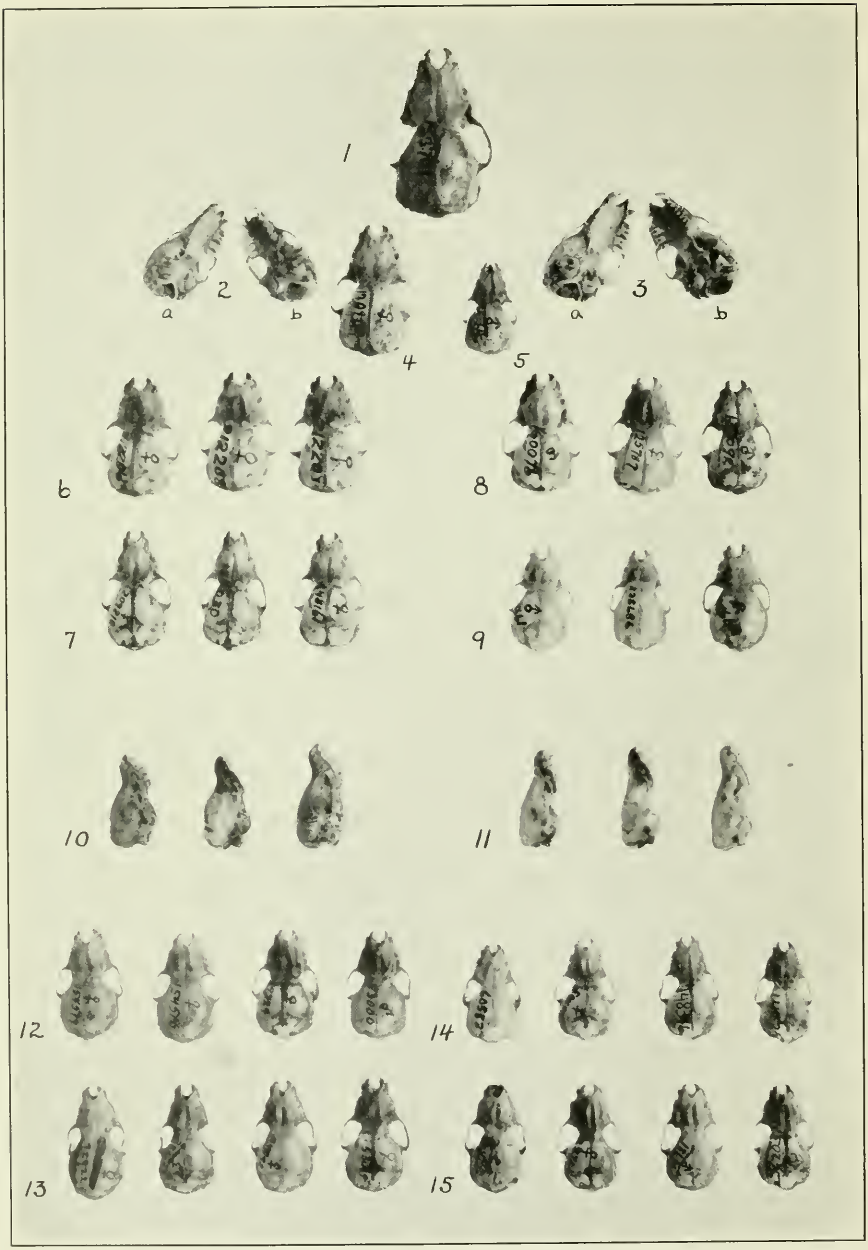
[2] Journ. Bombay Nat. Hist. Soc., vol. 23, p. 607.

The actual color is never bright. It ranges in different species from a very dark, almost blackish brown (*nigricans*, *chiloënsis*) through dull brown to a decided reddish brown (*ruber*, *californicus*), or, in desert races, to a very pale buff. The underparts are usually paler than the back, sometimes rather noticeably so (*albescens*), but there is never any striking color pattern. The ears and membranes vary from dull brownish to whitish or to almost black, sometimes (*albescens*, *nigricans*) nearly concolor with the back, sometimes (*evotis*, *subulatus* Say, not of H. Allen) strongly contrasted with it. Immature individuals are normally darker and duller than adults. No sexual differences in color have been detected, but two color phases independent of sex—a darker and a lighter, or duller and brighter—may not infrequently be observed. For example, in *M. lucifugus* an olive and a bronzy phase are present. In the South American *M. ruber* there is likewise the dark brown and the rusty phase; and rusty individuals of *M. nigricans* occasionally occur. In *M. evotis* as well as in *M. subulatus* (Say) the black pigmentation of the ears and membranes is a character usually retained even under desert conditions that bleach the color of the fur, while in the arid-country forms of *M. lucifugus* the ears are less intensely pigmented and the interfemoral membrane becomes whitish, with often a contrasting white border along the free edge of the wing.

Color differentiation among the species of *Myotis* is not very great. In the six species known to occur in the eastern United States the general brownish color is so nearly alike that it is often difficult to identify individual specimens by this character alone, although a comparison of enough skins shows that each animal has its distinctive hue. This general similarity has led to great confusion in the identification of specimens.

Skull.—In both form and size the skull presents variations which are useful in distinguishing species. Plate 1 has been prepared with the special object of giving a clear idea of these features. The great difference in size which separates *Pizonyx* from the largest known American *Myotis* is at once evident on comparison of Figure 1 (*Pizonyx*) with Figure 4 (*Myotis velifer incautus*). Figures 4 and 5 show the extremes of known variation in size of skull among the American species of *Myotis* (*M. velifer incautus* and *M. nigricans dominicensis*). Further inspection of the plate shows that the



SKULLS OF AMERICAN BATS OF THE GENERA MYOTIS AND PIZONYX. NATURAL SIZE

FOR EXPLANATION OF PLATE SEE PAGE VI

general outline of the skull may be narrower (*evotis*, fig. 7, *keenii*, fig. 13) or broader (*velifer*, fig. 6, *occultus*, fig. 8); that the brain case may be high (*volans*, fig. 10) or low (*subulatus*, fig. 11); that the area of the rostrum as compared with that of the brain case may be larger (*occultus*, fig. 8) or smaller (*albescens*, fig. 9); that the breadth of the rostrum across the roots of the canines may be more (*occultus*) or less (*albescens*) than the interorbital constriction; and that the sagittal crest may be conspicuous (*velifer*, figs. 4, 6) or essentially absent (*lucifugus*, fig. 12). Other important characters which can be less successfully illustrated by photographs are: The greater or less breadth of the palate, including the tooth rows (a measurement best taken at the point of contact between the outer borders of m^2 and m^3) as compared with the length of the upper tooth row (canine to third molar, both inclusive), and the greater or less crown area of the upper molariform teeth as compared with the area of the bony palate between the tooth rows (*chiloënsis* and *nigricans*, fig. 2; *velifer* and *lucifugus*, fig. 3).

Teeth.—The teeth vary in their general size relatively to the size of the skull; but a character of this kind is impossible to describe with any degree of accuracy. The difference in this respect between smaller toothed animals like *Myotis lucifugus* and *M. nigricans*, and larger toothed animals like *M. velifer* and *M. chiloënsis* is, however, appreciable on direct comparison (pl. 1, figs. 2 and 3).

The incisors and canines, both upper and lower, and the lower molars vary slightly in form; but we have not found that their peculiarities give much aid in the discrimination of species. No American *Myotis* has yet been discovered in which the second triangle of m_3 is so much reduced as it is in the type of the genus, the palearctic *M. myotis*.

The development and relative position of the two minute premolars both above and below is variable individually as well as in different species. Miller has published figures of the upper small premolars of four specimens of *Myotis thysanodes*, a species which appears to be especially subject to variation in this respect.[3] Usually, there is either a slight crowding, or else the posterior of the small teeth may be drawn inward from the tooth row, particularly in the case of the upper jaw, a condition well developed in the peculiar South American *Myotis simus*. The most progressive form, as regards the reduction of the tooth-formula, is *Myotis occultus*. In this animal there is a decided tendency toward the loss of the posterior of the small premolars in the upper jaw, while in the lower jaw the corresponding tooth is usually crowded inward away from the line. Occasional individuals of the other species or races may also lack one of these minute teeth; in most cases it is the second and smaller of the two which disappears. An anomaly which has been twice observed (in *M. thysanodes* No. 52228, U. S. N. M., and *M. lucifugus carissima* No. 38029, U. S. N. M.) consists in the coalescence of the two small teeth on one side of the upper jaw; and in one instance (see p. 53) we have found a third small tooth welded to the anterior margin of the large premolar.

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[3] North Amer. Fauna, No. 13, p. 82, Oct. 16, 1897.

The upper molars present some important structural peculiarities which should be carefully understood.

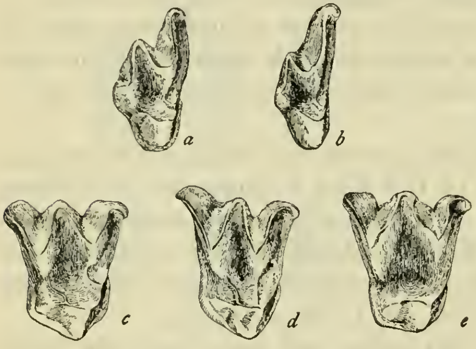

Fig. 1.—Molar teeth of Myotis and Pizonyx: *a*, m^3 of Myotis lucifugus; *b*, m^3 of Myotis myotis; *c*, m^2 of Myotis lucifugus; *d*, m^2 of Pizonyx vivesi; *e*, m^2 of Myotis thysanodes. All greatly enlarged, not to scale

In the first and second of these teeth the most complicated type of cusp development is the one which is found fully displayed in *Myotis lucifugus* (fig. 1*c*). In this type the hypocone is a large and obvious element of the crown plan, its base well indicated as a swelling distinct from that which forms the base of the protocone, its point sometimes but not always standing out from the high longitudinal loph which connects the summit of the protocone with that of the less elevated hypocone. A noticeable metaloph extends from the base of the metacone across the deep valley which lies between the metacone and hypocone. This ridge passes up the inner side of the hypocone to the longitudinal loph (as in the figure) or in some instances to the actual summit of the hypocone itself. On the anterior margin of the crown a conspicuous triangular protoconule lies in the space between the protocone and paracone. This small cusp is connected with the base of the paracone by a short but very obvious ridge which may be spoken of as the paraloph. The opposite extreme, so far as the American members of the genus is concerned, is seen in *Myotis thysanodes* (fig. 1*e*). Here the inner side of the tooth is somewhat narrowed, chiefly at the expense of the hypocone; the metaloph, protoconule, and paraloph have completely disappeared, leaving a deep smooth-floored valley between the hypocone and metacone and another between the protocone and paracone. In the type of the genus, the palearctic *Myotis myotis*, this reduction process is carried so far that the hypocone is normally smaller than in *M. thysanodes*, and in some individuals it practically does not exist as an element distinguishable from the base of the protocone. A peculiar condition is sometimes seen in the genus *Pizonyx* (fig. 1*d*). Here the hypocone and metaloph are essentially as in *Myotis* *lucifugus*, but the protoconule is absent and the paraloph may extend from the base of the paracone well up toward the summit of the protocone.

In the third upper molar the process of reduction seems to be concentrated on the posterior segment of the tooth. The anterior portion in *Myotis lucifugus* (fig. 1*a*) remains essentially as in the first and second teeth. The metastyle is, however, completely suppressed, and the loph extending to it from the metacone is reduced to a mere trace running downward and directly backward along the posterior surface of the metacone. The metaloph has also disappeared; but the hypocone is still visible as a minute remnant. Extreme reduction (fig. 1*b*) takes the form of still greater antero-posterior shortening of the crown, together with the complete and final elimination of the metaconule and its loph as well as the hypocone. In this stage, however, the protoconule usually persists, even when it has completely disappeared from m^1 and m^2. This condition is best shown by *Myotis myotis*, the species figured, but it is approached in the American *M. thysanodes* and *M. evotis.*

The crowns of the upper molars bear no cingulum on the outer side, but the lingual and hinder borders are margined by a cingulum which, beginning at about the level of the protoconule on the anterior side, extends around the lingual border and out along the posterior margin to the metastyle. This cingulum is subject to much variation in development. Usually its continuity is nearly or quite broken at the antero-lingual portion of the base of the protocone. Less often there is a break at the postero-lingual bulge of the base of the hypocone. In rare instances the cingulum may be reduced, along the entire lingual border of the crown, to a series of irregularly developed enamel nodules. Still more rarely it may bear an incipient cusp in the region of the hypocone. As is the case with the secondary cusps the cingulum shows a more reduced condition in the type species of the genus, *Myotis myotis*, than it does in any of the known American forms.

Were the extreme types of cusp development isolated they might well be considered as furnishing characters of generic or subgeneric importance, but so many intermediate conditions occur that it seems impossible to attribute any such weight to these structures. Apparently the more complicated type is the one which is to be regarded as representing the condition primitive for the genus *Myotis.* It occurs in all the American species except *M. evotis* and *M. thysanodes.* Among the Old World forms we have found it in specimens determined, with varying degrees of authenticity, as *adversus*, *bocagei*, *capaccinii*, *carimonensis*, *dasycneme*, *daubentonii*, *hildegardæ*, *macrotarsus*, and *muralis.* A more simplified structure resembling in different degrees that which is seen in the American *evotis* and *thysanodes* occurs in at least six Old World species: *bechsteinii*, *emarginatus*, *mystacinus*, *nattereri*, *rufopictus*, and *tricolor*. The extreme type of reduction we have seen in the *myotis* group only (*blythii*, *chinensis*, *myotis*, *oxygnathus*). This group, apparently, is not connected by intermediate stages of structure with any other members of the genus. It might, therefore, be separated as a subgenus or genus *Myotis* in the restricted sense. The name *Leuconoë* Boie would then be available for the great mass of species now called *Myotis*. At present, however, we are not convinced of the desirability of following this course, as the Old World members of the genus are still insufficiently known.

LIST OF THE FORTY-SIX RECOGNIZED FORMS OF AMERICAN MYOTIS, WITH THEIR TYPE LOCALITIES

A. NORTH AMERICAN

- MYOTIS LUCIFUGUS (p. 38):
    - *M. lucifugus lucifugus* (p. 43). Probably Georgia.
    - *M. lucifugus alascensis* (p. 47). Sitka, Alaska.
    - *M. lucifugus carissima* (p. 50). Yellowstone Park, Wyo.
    - *M. lucifugus* **phasma** (p. 53). Snake River, Colo.
    - *M. lucifugus* **fortidens** (p. 54). Teapa, Tabasco, Mexico.
- MYOTIS YUMANENSIS (p. 61):
    - *M. yumanensis yumanensis* (p. 65). Fort Yuma, Calif.
    - *M. yumanensis sociabilis* (p. 68). Hamilton, Wash.
    - *M. yumanensis saturatus* (p. 70). Old Fort Tejon, Calif.
    - *M. yumanensis* **lutosus** (p. 72). Patzcuaro, Michoacan, Mexico.
- MYOTIS AUSTRORIPARIUS (p. 76). Tarpon Springs, Fla.
- MYOTIS GRISESCENS (p. 80). Nickajack Cave, Tenn.
- MYOTIS VELIFER (p. 86):
    - *M. velifer velifer* (p. 89). Guadalajara, Jalisco, Mexico.
    - *M. velifer incautus* (p. 92). San Antonio, Tex.
    - *M. velifer peninsularis* (p. 93). San José del Cabo, Lower California, Mexico.
- MYOTIS OCCULTUS (p. 97). Near Needles, Calif.
- MYOTIS KEENII (p. 101):
    - *M. keenii keenii* (p. 104). Massett, Queen Charlotte Islands, British Columbia, Canada.
    - *M. keenii septentrionalis* (p. 105). Halifax, Nova Scotia.
- MYOTIS EVOTIS (p. 111):
    - *M. evotis evotis* (p. 114). Near Colville, Wash.
    - *M. evotis chrysonotus* (p. 116). Kinney Ranch, Sweetwater County, Wyo.
- MYOTIS MILLERI (p. 118). La Grulla, Lower California, Mexico.
- MYOTIS THYSANODES (p. 122):
    - *M. thysanodes thysanodes* (p. 126). Old Fort Tejon, Calif.
    - *M. thysanodes* **aztecus** (p. 128). San Antonio, Oaxaca, Mexico.
- MYOTIS **SODALIS** (p. 130). Wyandotte Cave, Ind.

MYOTIS VOLANS (p. 135):
  M. volans volans (p. 139). Cape St. Lucas, Lower California, Mexico.
  M. volans longicrus (p. 140). Puget Sound, Wash.
  M. volans interior (p. 142). Twining, N. Mex.
  M. volans amotus (p. 145). Cofre de Perote, Vera Cruz, Mexico.
MYOTIS CALIFORNICUS (p. 148):
  M. californicus californicus (p. 151). California.
  M. californicus caurinus (p. 155). Massett, Queen Charlotte Ids., British Columbia, Canada.
  M. californicus pallidus (p. 157). Vallecito, San Diego County, Calif.
  M. californicus mexicanus (p. 159). "Les terres chaudes de la province de Mexico."
MYOTIS SUBULATUS (p. 164):
  M. subulatus subulatus (p. 168). La Junta, Colo.
  M. subulatus melanorhinus (p. 169). San Francisco Mountain, Ariz.
  M. subulatus leibii (p. 171). Erie County, Ohio.

B. SOUTH AMERICAN

MYOTIS NIGRICANS (p. 175):
  M. nigricans nigricans (p. 177). Fazenda de Aga, near Rio Iritiba, province of Espirito Santo, eastern Brazil.
  M. nigricans extremus (p. 181). Huehuetan, Chiapas, Mexico.
  M. nigricans nesopolus (p. 182). Near Willemstad, Curacao, Dutch West Indies.
  M. nigricans dominicensis (p. 183). Dominica, British West Indies.
MYOTIS CHILOËNSIS (p. 189):
  M. chiloënsis chiloënsis (p. 190). Islets on the eastern side of Chiloe Island, southern Chile.
  M. chiloënsis dinellii (p. 191). Tucuman, Catamarca Province, Argentina.
  M. chiloënsis atacamensis (p. 192). Atacama, Chile.
  M. chiloënsis oxyotus (p. 193). Mount Chimborazo, Ecuador, at 9,000–10,000 feet latitude.
  M. chiloënsis alter (p. 194). Palmeiras, Parana, Brazil.
MYOTIS RUBER (p. 197). Paraguay.
MYOTIS ALBESCENS (p. 200). Paraguay.
MYOTIS SIMUS (p. 205). Sarayacu, on the Ucayali River, Loreto, eastern Peru.
[MYOTIS PILOSUS (p. 208). ?Montevideo, Uruguay.]

GEOGRAPHICAL RELATIONS OF THE AMERICAN SPECIES OF MYOTIS

That the genus *Myotis* is most abundantly represented in the temperate parts of America rather than the tropics, is indicated by the fact that of the 19 species here recognized as definitely pertaining to the New World, 14 (*austroriparius*, *californicus*, *evotis*, *grisescens*, *keenii*, *lucifugus*, *milleri*, *occultus*, *sodalis*, *subulatus*, *thysanodes*, *velifer*, *volans*, *yumanensis*) are exclusively North American, while only 5 (*albescens*, *chiloënsis*, *nigricans*, *ruber*, *simus*) are confined to the neotropical region. It must be remembered, however, that our present knowledge of the South American members of the genus is still far from complete.

The most widespread American species is *Myotis lucifugus*, whose range extends to tree limit in the north and to southern Mexico in the south. It becomes modified into five geographic races under the changing conditions of this geographical area, but its structural characters remain very constant. The fact, therefore, is rather remarkable that a genus whose members may be capable of pushing their range so far should be absent from the West Indies except in the southern Lesser Antilles (Grenada, Dominica), where the tropical *Myotis nigricans* has gained a foothold, having undoubtedly come in from northern South America. A representative of the same species occurs on the island of Curaçao. Such a distribution, however, is in line with the pronounced northern affinities of the genus; it also serves, perhaps, to emphasize the long isolation of the Antilles from the continent. We have too little accurate knowledge of the distribution of *Myotis* in tropical America to say whether or not the known species are mainly found at the higher levels and in cool forest, but such may not improbably be the case.

In the northern continent a general correspondence may be traced between some of the American species and those of the Eastern Hemisphere. There appears to be little doubt that the long-eared American *Myotis keenii*, *M. evotis*, and *M. thysanodes* are not distantly related to the Old World *M. nattereri* (with its Japanese race *bombinus*) and *M. emarginatus*. The Palearctic *Myotis daubentonii* has characters allying it to *M. lucifugus*, while a Chinese species, *M. frater*, seems to be the Old World counterpart of *M. volans*. Similarly, the Chinese *M. moupinensis* may be regarded as the Old World representative of *M. californicus*, which it closely resembles in its small size, bodily proportions, delicate feet, keeled calcar, and long fur. The range of the American species *volans* and *californicus* now reaches as far north as the coast of southern Alaska, and that of *evotis* and *yumanensis* nearly, if not quite, as far. Presumably, the northward extent of their representatives in the Old World will be found to be limited by corresponding isotherms on the Asiatic side, and this fact, if it could eventually be substantiated, would be in a measure indicative of the higher temperature that must once have prevailed to the northward at the time when the ranges of these now slightly differentiated species were continuous from Asia to America by way of a northern land connection providing favorable climatic conditions. For it is not unreasonable to suppose that by some such immigration these American species were derived from Asia and that by subsequent evolution specific differences have arisen. On the other hand, there is no obvious explanation of the fact that the very large species, such as the European and Asiatic *Myotis myotis* and *M. chinensis* have no representatives in the New World; but in this connection it should be recalled that these bats are not known to occur in either the British Islands or Japan, a fact which may indicate that they are more sedentary in habit than some of their smaller relatives.

That the American *Myotis* stock came originally from the northern part of the Old World is made to appear probable by the following circumstances: The greater variety and higher degree of differentiation among the Palearctic members of the genus, an indication of greater age for this portion of the group; the occurrence of the greatest number of American species in western North America, the region nearest the supposed Asiatic source of supply; and finally the diminution in number of species as we go away from this western region, either toward the east or toward the south.

Three North American species of *Myotis* have geographical ranges which extend across the continent from ocean to ocean. They are *M. lucifugus* with a north-south distribution from tree limit to southern Mexico, *M. keenii* (= the *subulatus* of H. Allen and recent authors) with a range from the southeastern United States to British Columbia and southern Alaska, and *M. subulatus* (of Say) practically confined to the United States. All of the others are restricted either to the East or to the West.

North America east of the Mississippi is inhabited by three species peculiar to the region, all of them rather imperfectly known as to details of distribution, though structurally they are well differentiated from each other and from the three wide ranging types which occur with them. One of these, *M. grisescens*, appears to be peculiar to the limestone cave region of the central and southern United States, another, also apparently a cave bat, *M. sodalis*, has been found in the Southern States and in Vermont, while the third, *M. austroriparius*, has been observed in only two regions, one in Indiana and the other on the west coast of Florida.

In contrast to the eastern United States, western North America, the portion of the New World nearest the supposed Asiatic center of dispersal, has no less than eight species not yet known to occur elsewhere. One of these (*milleri*) has thus far been collected at a single locality only, in Lower California; the others have wide and well-defined ranges in the region west of the plains. Four of these (*californicus*, *evotis*, *volans*, and *yumanensis*) extend from the northwest coast region to southern Mexico, two (*thysanodes* and *velifer*) do not range so far to the north, while the remaining species, *occultus*, still imperfectly known, appears to be restricted to the southwestern United States and the adjoining parts of Mexico.

Of the five species definitely known to inhabit South America, three, *chiloënsis*, *nigricans*, and *ruber*, are generally distributed and not strongly differentiated from each other. Their nearest relatives to the north appear to be *M. lucifugus* and *M. yumanensis*. Probably as wide ranging is the more highly specialized *M. albescens*. The fifth species, *M. simus*, one of the most strikingly characterized American members of the genus, is known from two localities about 250 miles apart on the lowlands east of the Andes.

A feature which is noticeable among the American members of this group is the usually inverse ratio between distribution and differentiation. The four nearly related and slightly specialized species *Myotis lucifugus*, *M. yumanensis*, *M. chiloënsis*, and *M. nigricans* cover practically the entire American area inhabited by these bats; at the opposite extreme of structural modification we find *Pizonyx*, an animal whose area of dispersal is restricted, apparently, to the coast and islands of the Gulf of California. The range of *Myotis velifer* includes most of Mexico and the adjoining part of the United States; that of the more highly specialized *M. occultus* is, according to present knowledge at least, decidedly less extensive. The seemingly narrow ranges of such aberrant species as *Myotis grisescens* and *M. simus* are in noticeable contrast with the large areas occupied by *M. keenii* and *M. subulatus*. On the other hand the range of the highly specialized *M. volans* is practically coincident with that of the rather primitive *M. yumanensis*.

Where species spread over areas of strikingly different climatic conditions, they usually show a corresponding color variation. This seems to be chiefly a response to the degree of atmospheric saturation or dryness. Thus along the humid coast of the Northwest, from southern Alaska to California, no less than five different *Myotis* are represented by darkened ("saturate") local forms. In the semiarid regions farther eastward, the color becomes less intense over a wide area of country from the interior of California northeastward, while under the desert conditions of the Southwest and parts of the interior of the United States, the same species become extremely pale. Still farther south, in southern Mexico, they again darken in color; while in the eastern United States, they may be of a different color still, neither saturate nor pallid.

In the following table are listed the geographical races of six North American species of *Myotis* grouped according to the general climatic areas inhabited.

Species	Saturate, northwest coast	Semiarid, California and northeastward	Dry or desert, interior	Subtropical, Mexican	Eastern, moderately humid
lucifugus	*alascensis*	*carissima*	*phasma*	*fortidens*	*lucifugus.*
yumanensis	*saturatus*	*sociabilis*	*yumanensis*	*lutosus*	
evotis	*evotis*	*chrysonotus*	*chrysonotus*	(?)	
volans	*longicrus*	*volans*	*interior*	*amotus*	
californicus	*caurinus*	*californicus*	*pallidus*	*mexicanus*	
subulatus	------------	*melanorhinus.*	*subulatus*	------------	*leibii.*

The fact that the wide-ranging species break up so readily into subspecies corresponding to areas of different climatic conditions perhaps indicates that the bats of this genus are very little migratory and that such migration as there may be probably consists in nothing more than a local withdrawal to certain not-distant caves for hibernation, or in some cases in an invasion of near-by alpine heights during the warm months at the close of the breeding period.

NOMENCLATURE OF THE AMERICAN SPECIES OF MYOTIS

No less than 102 trivial names have been given to American bats of the genus *Myotis*. Only 39 of these are here regarded as the valid designations of recognizable forms. We are proposing 7 new names for species and races not hitherto discriminated. The total number is thus raised to 109 names for 46 forms, an average of nearly 2.4 names to a form. This average, among the genera of American mammals, which have been recently revised, is high.[4] It may be taken as some index to the difficulty and confusion which have attended the study of these bats.

The following are the names which have been applied to species and subspecies of American *Myotis:*

Aenobarbus (*Vespertilio*) Temminck, Monogr. de Mamm., vol. 2, p. 247, pl. 59, fig. 4, 1840. The specimen on which this name was based is presumably still in the Leiden Museum; it came from an unknown locality in South America. Though the tooth formula is not given, Temminck's figure of the head shows the characteristic long narrow tragus of *Myotis*, while the proportions of tail to total length and the description of the color leave little doubt that the name is a synonym of *M. albescens.*

Affinis (*Vespertilio*) H. Allen, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 53, June, 1864. Examination of the type specimen (No. 5342, U. S. Nat. Mus.) shows it to be referable to the eastern race of *Myotis lucifugus.*

Agilis (*Vespertilio*) H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 282. This name, based on specimens from Mirador, Vera Cruz, was applied to the Mexican representative of *M. californicus.* It is antedated by *Vespertilio mexicanus* Saussure, 1860.

Alascensis (*Myotis lucifugus*) Miller, North Amer. Fauna, No. 13, p. 63, October 16, 1897. The only name applied to the dark subspecies of *M. lucifugus* occuring on the humid northwest coast.

Albescens (*Vespertilio*) E. Geoffroy, Ann. Mus. d'Hist. Nat. Paris, vol. 8, p. 204, 1806. This name, based on the "Chauve-souris douzième" of Azara's Essais sur l' Histoire Naturelle du Paraguay, 1801, was the first to be applied to the species which now bears the name *Myotis albescens.*

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[4] In some of the other groups it is as follows: *Ochotona,* 1.04; *Thomomys,* 1.1; *Leporidæ,* 1.3; *Oryzomys,* 1.3; *Spilogale,* 1.3; *Peromyscus,* 1.5; *Vespertilionine* bats other than *Myotis,* 1.7; *Talpidæ,* 1.8.

Albicinctus (*Myotis*) G. M. Allen, Journ. Mamm., vol. 1, p. 2, November 28, 1919. This name proves to be a synonym of *Myotis lucifugus carissima*, the pale subspecies of *M. lucifugus* from the semiarid parts of the western United States.

Altifrons (*Myotis*) Hollister, Smithsonian Misc. Coll., vol. 56, No. 26, p. 3, December 5, 1911. The type specimen is from Henry House, Alberta. It is not distinguishable from other examples of the dark *M. volans longicrus.*

Altipetens (*Myotis yumanensis*) H. W. Grinnell, Univ. California Publ. Zool., vol. 17, p. 9, August 23, 1916. At first described as a race of *Myotis yumanensis*, the animal was later correctly recognized by its describer as a pale form of *M. lucifugus* (Univ. California Publ. Zool., vol. 17, p. 263, January 31, 1918). The name is antedated by *Myotis carissima* Thomas, 1904.

Amotus (*Myotis longicrus*) Miller, Proc. Biol. Soc. Washington, vol. 27, p. 212, October 31, 1914. The tenable name for the Mexican subspecies of *Myotis volans*; type from Cofre de Perote, Vera Cruz.

Arsinoë (*Vespertilio*) Temminck, Monogr. de Mamm., vol. 2, p. 247, 1840. The specimen which formed the basis for this name came from Surinam, and was said by Dobson (1878) to be in the Leiden Museum. The six cheek teeth in each jaw indicate that it was a *Myotis*, while the description as a whole applies to the *Vespertilio albescens* of Geoffroy, 1805.

Atacamensis (*Vespertilio*) Lataste, Actes Soc. Sci. Chile, Santiago, vol. 1, p. 79, 1892. This is the tenable name for the small gray-haired race of *Myotis chiloënsis* occurring in the arid western coast region of South America. Lataste briefly pointed out some of the more important characters. He attributes the name to Philippi, who had so labeled the specimens in the Santiago Museum. Philippi's description and plate did not appear until 1896, however, hence the authorship of the name must date from Lataste on the basis of his short diagnosis.

Austroriparius (*Vespertilio lucifugus*) Rhoads, Proc. Acad. Nat. Sci. Philadelphia, p. 157, May 22, 1897. Misled by the immaturity of the type specimen, Miller (1897) placed this name in the synonymy of *Myotis lucifugus lucifugus.* Additional material shows that the animal is a distinct species, known at present from the vicinity of Tarpon Springs, Fla. (the type locality), and from Mitchell, Indiana. A specimen in the British Museum, collected by Drummond, is labeled "North America." It may have come from the interior of Canada.

Baileyi (*Myotis*) Hollister, Proc. Biol. Soc. Washington, vol. 22, p. 44, March 10, 1909. The type specimen (from Ruidoso, N. Mex.), is a large individual of *M. occultus* Hollister in the olive phase of pelage.

Bayleyi (*Myotis*) Lydekker, Zool. Record, 1909, Mammalia, p. 59, 1913. This is a misprint for *baileyi* Hollister.

Bondæ (*Myotis*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 384, July 9, 1914. This name was given to the form of *M. nigricans* from Bonda, Santa Marta, Colombia. The animal seems, however, to be identical with *M. nigricans nigricans.*

Brasiliensis (*Vespertilio*) Spix, Sim. et Vespert. Brasil. Sp. Nov., p. 63, pl. 36, fig. 8, 1823. The figure and description indicate that this bat is identical with *Myotis nigricans*, also from Brazil. This is the first name applied to the species, but it is preoccupied by *V. brasiliensis* Desmarest, 1822, for a different animal, an *Eptesicus.* It was replaced by *Vespertilio spixii* Fischer in 1829, but Wied had meanwhile (1826) described the species as *V. nigricans.*

Brevirostris (*Vespertilio*) Maximilian zu Wied, Verzeich. beobacht. Säugeth. N. Amer., Arch. f. Naturgesch., 1861, vol. 1, p. 195. There is almost nothing in the description of this bat that is diagnostic, except the yellowish tint of the belly. This and the general account, as well as the locality (Freiburg, Pa.) leave little doubt that Wied's animal was *Myotis lucifugus.* The type was said to be lost.

Californicus (*Vespertilio*) Audubon and Bachman, Journ. Acad. Nat. Sci. Philadelphia, ser. 1, vol. 8, p. 285, 1842. Although no locality beyond "California" is given, the original description applies to the small reddish-brown *Myotis* of the southern part of that State. The small feet are specially mentioned and the "light yellowish-brown" color above, slightly darker beneath. While this might refer as well to a race of *Myotis subulatus* (Say, not recent authors), Miller (1897) has definitely assigned the name to the smaller species.

Capitaneus (*Myotis*) Nelson and Goldman, Proc. Biol. Soc. Washington, vol. 22, p. 28, March 10, 1909. This name was given to the typical race of *M. volans* before the latter name had been correctly allocated through a reexamination of the type (from Cape St. Lucas, Lower California). Since the type of *Myotis capitaneus* is also from Lower California (near Comondu) the name becomes a synonym of *M. volans.*

Capucinus (*Vespertilio*) Philippi, Arch. f. Naturgesch., 1866, vol. 1, p. 114. Trouessart (Catal. Mamm. viv. foss., suppl., p. 94, 1904) includes this as a species of *Myotis*, but Lataste (Actes Soc. Sci. Chile, Santiago, vol. 1 (1891), p. 90, 1892), who examined Philippi's type in Santiago, had shown that it is a *Histiotus* identical with *H. magellanicus.*

Carissima (*Myotis*) Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 13, p. 383, May, 1904. This is the first name applied to the pale subspecies of *M. lucifugus* inhabiting the semi-arid portions of the western United States (type from Yellowstone Park, Wyo.). The word is intended as an equivalent to the surname of the collector of the type, Darling. (Italian *cosa carissima.*)

Carolii (*Vespertilio*) Temminck, Monogr. de Mamm., vol. 2, p. 237, 1840. The description of this bat was based on specimens from Philadelphia and New York. It unquestionably applies to *Myotis lucifugus* LeConte, 1831.

Caucensis (*Myotis*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 386, July 9, 1914. The description is based on a large specimen of *M. nigricans* from Cauca, Colombia.

Caurinus (*Myotis californicus*) Miller, North Amer. Fauna, No. 13, p. 72, October 16, 1897. This is the first name applied to the dark race of *M. californicus* inhabiting the humid northwest coast district (type from Massett, Queen Charlotte Islands, British Columbia).

Chiloënsis (*Vespertilio*) Waterhouse, Zool. Voyage H. M. S. Beagle, pt. 2, Mamm., p. 5, pl. 3, 1838. This is the first name given to a rather widely ranging South American species related to *Myotis nigricans*. The type was from Chiloe Island.

Chiriquensis (*Myotis*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 20, p. 77, February 29, 1904. As first pointed out by Goldman (Smithsonian Misc. Coll., vol. 69, No. 5, p. 213, April 24, 1920), the shortness of the forearm, which was supposed to distinguish this species from *M. nigricans*, is an accidental character due to mutilation in both wings of the type skin. The specimen (from Chiriqui, Panama) is identical with the Central American bat which we regard as *M. nigricans nigricans*.

Chrysonotus (*Vespertilio*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 8, p. 240, November 21, 1896. This name is available in a subspecific sense for the pale race of *Myotis evotis* which occupies the greater part of the animal's range. The type was from Sweetwater County, Wyo.

Ciliolabrum (*Vespertilio*) Merriam, Proc. Biol. Soc. Washington, vol. 4, p. 1, December 7, 1886. Though long considered a form of *Myotis californicus*, the bat to which this name was applied proves to be the typical race of a distinct species, the animal first described as *Vespertilio subulatus* by Say in 1823 but not clearly recognized until 1918, when its true characters were pointed out by Mrs. Grinnell under the name *orinomus* (Univ. Calif. Publ. Zool., vol. 17, p. 290, January 31, 1918).

Cincinnus (*Vespertilio*) H. Allen, Bull. U. S. Nat. Mus., No. 43 (1893), p. 97, footnote, March 14, 1895. A misspelling of *concinnus*, here used inadvertently no doubt, but appearing in the index as well as in the text.

Cinnamomeus (*Vespertilio*) Wagner, Schreber's Säugthiere, Suppl., vol. 5, p. 755, 1855. Wagner believed that Rengger was correct in considering Azara's "Chauve-souris cannellé" a *Noctilio.* Since Azara's description was the basis of *Vespertilio ruber* of E. Geoffroy, Wagner proposed *cinnamomeus* as a substitute for the name *ruber* as used by D'Orbigny and Gervais for a red *Myotis* from Corrientes, Argentina. Azara's animal, however, is now known to have been this same red *Myotis*, so that the two names, *ruber* and *cinnamomeus*, were actually based on one bat.

Concinnus (*Vespertilio*) H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 280. This name, applied to specimens from San Salvador, proves to have been based on the large form of *Myotis nigricans* inhabiting Central America and not, as orginally supposed by Miller (Proc. Biol. Soc. Washington, vol. 13, p. 154, June 13, 1900), on the Mexican race.

Crassus (*Vespertilio*) F. Cuvier, Nouv. Ann. Mus. d'Hist. Nat. Paris, vol. 1, p. 18, 1832. This name is practically impossible to allocate with certainty. It was based on a specimen sent from New York, and is probably a synonym of *Myotis lucifugus.*

Dinellii (*Myotis*) Thomas, Ann. Mag. Nat. Hist., ser. 7, vol. 10, p. 493, December, 1902. This is the only name applied to the bright-colored race of *Myotis chiloënsis* occurring in the drier parts of northwestern Argentina.

Domesticus (*Vespertilio*) Green, in Doughty's Cabinet of Nat. Hist., vol. 2, p. 290, 1832. The description as well as the house-haunting habit of this bat leave little doubt that it is the same animal as LeConte's *V. lucifugus* described the previous year.

Dominicensis (*Myotis*) Miller, Proc. Biol. Soc. Washington, vol. 15, p. 243, December 16, 1902. This is the form of *M. nigricans* found in the island of Dominica, Lesser Antilles.

Durangæ (*Myotis californicus*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 19, p. 612, November 12, 1903. An examination of the type and other specimens from Durango on which the description was based, shows that all are typical *M. yumanensis yumanensis.*

Durangoæ (*Myotis californicus*) Trouessart, Cat. Mamm. viv. foss., suppl., p. 93 1904. A modification of *durangæ.*

Esmeraldæ (*Myotis*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 385, July 9, 1914. We are unable to distinguish the form of *Myotis nigricans* on which this name was based from the typical subspecies.

Evotis (*Vespertilio*) H. Allen, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 48, June, 1864. This is the first name given to the long-eared *Myotis* of the western United States.

Exiguus (*Vespertilio*) H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 281. The description of this bat leaves little doubt that it is identical with *M. nigricans* (described as *Vespertilio concinnus* on the previous page). The type specimen was from Aspinwall, now Colon, Panama.

Exilis (*Vespertilio*) H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 283. This is a synonym of *Myotis californicus.* The type came from Cape St. Lucas, Lower California.

Ferrugineus (*Vespertilio*) Temminck, Monogr. de Mamm., vol. 2, p. 239, 1840. Trouessart in his Catal. Mamm. viv. foss., suppl., 1904, p. 90, includes this as a valid species of *Myotis*, following Dobson. The original description, based on specimens in alcohol from Surinam, states that there were $\frac{4}{5}$ teeth posterior to the canine, which indicates probably an *Eptesicus.* Moreover, the name *Vespertilio ferrugineus* is preoccupied by the *V. ferrugineus* of C. L. Brehm, 1827, which is a synonym apparently of some European species of *Nyctalus.* It therefore requires no further consideration here.

Gayi (*Vespertilio*) Lataste, Actes Soc. Sci. Chile, Santiago, vol. 1 (1891), p. 81, 1892. The specimen figured and described by Gervais in Gay's Historia de Chile, Zool., vol. 1, p. 42, 1847, as *Vespertilio chiloënsis* was slightly unusual in having the posterior minute premolar of the upper jaw crowded into the angle behind the front corner of the large third premolar. For this reason Lataste believed it to be a distinct species and named it *Vespertilio gayi.* Gervais mentions that it is often taken in the houses at Valdivia, Chile. The name is a synonym of *Myotis chiloënsis chiloënsis.*

Grisescens (*Myotis*) Howell, Proc. Biol. Soc. Washington, vol. 32, p. 46, March 10, 1909. This is the name of a large gray *Myotis* of the southeastern United States, distinguished among American species by the fact that the wing arises from the tarsus rather than from the base of the toes.

Gryphus (*Vespertilio*) F. Cuvier, Nouv. Ann. Mus. d'Hist. Nat. Paris, vol. 1, p. 15, 1832. Although Cuvier's description offers very little that is diagnostic, it is likely that this name is a synonym of *Myotis lucifugus.* That the animal was a member of the genus *Myotis* is rendered probable by the lancet-shaped tragus and the two minute premolars in each jaw (in addition of course to the larger third premolar); the size and color apply fairly well also. The specimen came from near New York.

Henshawii (*Vespertilio nitidus*) H. Allen, Bull. U. S. Nat. Mus., No. 43 (1893), p. 103, March 14, 1894. This name was proposed in a tentative way for two specimens collected by H. W. Henshaw near Wingate, N. Mex., in 1872 (entered together under the number 12450 (U. S. Nat. Mus.). These, though referred to "*V. nitidus cilio-*

labrum" (=*Myotis subulatus subulatus*), were recognized as in some way different, and the name *henshawii* was proposed in case further study confirmed this conclusion. It seems not unlikely that they were examples of the southwestern race of *Myotis subulatus*, for which Merriam's name *melanorhinus*, 1890, has priority. The cotypes can not now be found in the National Museum collection, though they were indicated as present by Miller in his Lists of 1911 and 1923, probably on insufficient evidence.

Hypothrix (*Vespertilio*) D'Orbigny and Gervais, Voy. dans l'Amér-Mérid., vol. 4, pt. 2, Mammifères, pp. 14 (footnote), 16, 1847. The species on which this name was founded is said by its authors to be common in the Mojos country of eastern Bolivia. It is apparently identical with *Myotis nigricans nigricans.*

Hypothryx (*Vespertilio*) D'Orbigny and Gervais, Voy. dans. l'Amér. Mérid., vol. 4, pt. 2, Mammifères, p. 16, 1847. Apparently a misprint for *hypothrix*, the spelling that occurs on p. 14 (footnote).

Incautus (*Vespertilio*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 8, p. 239, November 21, 1896. This is the name of the slightly differentiated pale northern race of *Myotis velifer.* The type locality is San Antonio, Tex.

Interior (*Myotis longicrus*) Miller, Proc. Biol. Soc. Washington, vol. 27, p. 211, October 31, 1914. This now stands as *M. volans interior*, for the pale race of the long-legged bat of the arid West. The type locality is Twining, Taos County, N. Mex.

Isidori (*Vespertilio*) D'Orbigny and Gervais, Voy. dans l'Amér. Mérid., vol. 4, pt. 2, Mammifères, p. 16, 1847. The description of this bat, based on a specimen from Corrientes, Argentina, leaves no doubt that it is the same as *M. albescens* Geoffroy, 1805.

Jaliscensis (*Myotis californicus*) Menegaux, Bull. Mus. d'Hist. Nat. Paris, vol. 7, p. 321, 1901. The cotypes of this species, which came from near Lake Zacoalco, Jalisco, Mexico, are in the Paris Museum, where Miller examined them in 1904 and found them to be examples of *Myotis velifer velifer.*

Keaysi (*Myotis ruber*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 383, July 9, 1914. This is a name based on the red phase of *Myotis nigricans nigricans.*

Keenii (*Vespertilio subulatus*) Merriam, Amer. Nat., vol. 29, p. 860, September, 1895. This is the first name unquestionably based on the moderately long-eared species which has been generally but incorrectly known as *Myotis subulatus*, that is, the *subulatus* of Harrison Allen, 1864, but not of Say, 1823. The type locality, Massett, Queen Charlotte Islands, British Columbia, lies within the area occupied by the dark northwest coast form of the species.

Kinnamon (*Vespertilio*) Gervais, Expéd. Amér. du Sud du Castelnau, Zool., Mammifères, p. 84, pl. 15, fig. 1, 1855. The description of the teeth and color, as well as the measurements (forearm 40 mm.) leave no doubt that this animal is identical with *M. ruber* (Geoffroy), 1805. The type was from Capella Nova, Brazil.

Lanceolatus (*Vespertilio*) Maximilian zu Wied, Reise in das Innere Nord-America, vol. 1, p. 364, footnote, 1839. The name was based on two specimens of a small bat from Bethlehem, Pa. It was originally proposed as a substitute for *Vespertilio subulatus*, should the bat which Maximilian so designated prove to be different from Say's animal. Maximilian's *subulatus*, however, appears to be the same as *M. lucifugus* LeConte, 1836.

Leibii (*Vespertilio*) Audubon and Bachman, Journ. Acad. Nat. Sci. Philadelphia, ser. 1, vol. 8, p. 284, 1842. These authors carefully described a small bat from Erie County, then Michigan, now Ohio, pointing out the obvious characters of small size, small foot, long tail, and contrasting black ears and wings that distinguish the small black-faced bat of the eastern United States. The name has been considered a synonym of *Myotis lucifugus*, though the original authors showed their familiarity with that animal by redescribing it under the name *V. virginianus* in the same paper. In recent years the discovery of additional specimens of *leibii* proves that it is a valid form, the eastern race of *Myotis subulatus* Say, 1823 (not the *subulatus* of Harrison Allen, 1864, and recent writers). The name, therefore, in the form *Myotis subulatus leibii*, replaces *Myotis winnemana* Nelson, 1913.

Leucogaster (*Vespertilio*) Maximilian zu Wied, Beitr. z. Naturg. Brasil, vol. 2, p. 271, 1826. Wied's description as well as his excellent colored figure in the Abbildungen zur Naturg. Brasil, pt. 13, 1829, leave no doubt that this animal is the same as the *V. albescens* of E. Geoffroy, 1805. His specimen was from the Moucouri River, Brazil.

Longicrus (*Vespertilio*) True, Science, vol. 8, p. 588, December 24, 1886. This is the valid name for the dark subspecies of *Myotis volans* occurring in the humid northwest coast district. The type came from Puget Sound, Washington.

Lucifugus (*Vespertilio*) LeConte, McMurtrie's Cuvier, Animal Kingdom, vol. 1, p. 431, 1831. Though the original description contains little that is useful for allocating this name, the later and more detailed account (Proc. Acad. Nat. Sci. Philadelphia, 1855, p. 436) shows that LeConte had in mind the common small brown *Myotis* of eastern North America, to which the name is currently applied (see Miller, North Amer. Fauna, No. 13, p. 29, October 16, 1897). The type locality is assumed to be Georgia, at or near LeConte's home in the vicinity of Riceboro, Liberty County.

Macropus (*Vespertilio*) H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 288. This name is a synonym of *Myotis yumanensis* of the same author, published two years previously. The type was collected at Fort Mohave ("Majaor" in original description; see Lyon and Osgood, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 271, January 28, 1909) on the Colorado River, western Arizona. The name is preoccupied by *V. macropus* Gould, 1854, for an Australian bat.

Maripensis (*Myotis*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 385, April 20, 1914. Though it has been regarded as a full species, this bat is apparently nothing else than true *Myotis nigricans*. Some of the specimens are less dark than usual, but we are unable to define the form. The type locality is Maripa, Rio Caura, Venezuela.

Melanorhinus (*Vespertilio*) Merriam, North Amer. Fauna, No. 3, p. 46, September 11, 1890. This appears to be the valid name for the form of *Myotis subulatus* Say (not of H. Allen and subsequent writers) of the southwestern United States and Mexican border. The type came from San Francisco Mountain, Arizona, and has been generally regarded as a specimen of *M. californicus*.

Mexicanus (*Vespertilio*) Saussure, Rev. et Mag. de Zool., ser. 2, vol. 12, p. 282, 1860. This is the first name applied to the large richly colored Mexican race of *Myotis californicus*. The type was said to have come from "les terres chaudes de la province de Mexico."

Micronyx (*Myotis*) Nelson and Goldman, Proc. Biol. Soc. Washington, vol. 22, p. 28, March 10, 1909. A name based on the Lower Californian form of *Myotis evotis*, apparently not distinguishable from *M. evotis chrysonotus*.

Milleri (*Myotis*) Elliot, Publ. Field Columbian Mus., zool. ser., vol. 3, p. 172, April, 1903. This is the only name applied to a peculiar local form, related to *Myotis evotis* but apparently a distinct species, known only from a few specimens taken in the San Pedro Martir Mountains, Lower California.

Mundus (*Vespertilio*) H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 280. An examination of the specimen on which the description of this species was based, shows it to be an immature example of *Myotis albescens* Geoffroy. It came from Maracaibo, Venezuela.

Nesopolus (*Myotis*) Miller, Proc. Biol. Soc. Washington, vol. 13, p. 123, April 6, 1900. This is the only name given to the form of *Myotis nigricans* inhabiting the island of Curaçao.

Nesopotus (*Myotis*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 384, April 20, 1914. A misprint for *nesopolus*.

Nigricans (*Vespertilio*) Maximilian zu Wied, Beitr. z. Naturg. Brasil, vol. 2, p. 266, 1826. This is the first valid name applied to the common small blackish *Myotis* of tropical South America. The type was from the Rio Iritiba, Espirito Santo, Brazil.

Nitens (*Vespertilio*) Wagner, Schreber's Säugthiere, suppl., vol. 5, p. 810, pl. 51, fig. 4, 1855. Referred by Trouessart to *Myotis*, and possibly a synonym of *M. nigricans;* Wagner's figure of the tragus, however, does not show the form typical of this genus.

Nitidus (*Vespertilio*) H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 247. From the original description as well as from the more detailed later account with figures (Bull. U. S. Nat. Mus., No. 43 (1893), p. 94, pl. 12, March 14, 1894), there is no doubt that this name applies to the bat which had already been described as *Vespertilio californicus* by Audubon and Bachman. This fact Doctor Allen himself partly recognized; but he regarded a new name as desirable on account of the supposed impossibility of identifying *Vespertilio californicus* with full certainty. His specimens were from Monterey, Calif., and Fort Steilacoom, Wash., therefore including representatives of two geographical races. Miller (1897), the first reviser, selected Monterey as the type locality and gave a new name (*caurinus*) to the dark northwestern form. For reasons which appear to us to be insufficient Lyon and Osgood (Bull. U. S. Nat. Mus., No. 62, p. 272, January 28, 1909) reversed the decision of Miller by regarding one of the specimens from Fort Steilacoom as the type. (On this subject see also H. W. Grinnell, Univ. California Publ. Zool., vol. 17, p. 283, January 31, 1918.)

Nubilus (*Vespertilio*) Wagner, Schreber's Säugthiere, suppl., vol. 5, p. 752, 1855. This was described by Wagner from Natterer's specimens, the same apparently that served Temminck for his description of *Vespertilio albescens* (not of Geoffroy). They were collected in southern Brazil and with their $\frac{6}{6}$ cheekteeth, slender tragus, and wings from the base of the toes were evidently representatives of a species of *Myotis.* Wagner describes the coloring thus: "Die Haare sind am Grunde schwarzbraun, auf der Oberseite allmählig in's russig Kastanienbraun übergehend, auf den Bauch mit gelbbraunlichen Spitzen." The forearm was 1 inch 4 lines long or about 37 mm. From this description it seems clear that Wagner's bat was, like Temminck's *albescens*, the *M. ruber* of Geoffroy, 1805.

Obscurus (*Vespertilio*) H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 281. As first shown by Goldman (Proc. Biol. Soc. Washington, vol. 27, p. 102, May 11, 1914), the type of this species, from Lower California, proves to be the same as *Vespertilio yumanensis* H. Allen, 1864.

Occultus (*Myotis*) Hollister, Proc. Biol. Soc. Washington, vol. 22, p. 43, 1909. This name is applicable to a peculiar and imperfectly known species inhabiting the southwestern United States and adjoining parts of Mexico.

Oregonensis (*Vespertilio*) H. Allen, Monogr. Bats North America, Smithsonian Misc. Coll., No. 165, p. 61, June, 1864. This was originally a manuscript name written by LeConte on the label of a specimen of *Myotis californicus* bearing no more definite indication of locality than the words "United States." In placing it formally in print, H. Allen mentions three other specimens (one from Cape St. Lucas, Lower California, and two from Fort Yuma, Calif.), for which, if they should prove to be distinct from his *V. nitidus* (=*M. californicus*), "this name will be reserved." While the first of these specimens is doubtless best considered as true *Myotis californicus*, the two others are *M. californicus pallidus*, so that the form as originally understood was a composite. In view of these facts it seems best to follow Miller, 1897, as first reviser, in relegating the name *oregonensis* to the synonymy of *M. californicus californicus.*

Orinomus (*Myotis*) Elliot, Publ. Field Columbian Mus., zool. ser., vol. 3, p. 228, June, 1903. This bat, described from La Grulla, San Pedro Martir Mountains, Lower California, is the same as *M. subulatus melanorhinus* (Merriam), 1890, from San Francisco Mountain, Arizona.

Oxyotus (*Vespertilio*) Peters, Monatsber. k. Akad. Wiss. Berlin, p. 19, 1866. This is the first name based on the long-eared form of *Myotis chiloënsis* occurring in the Andes. The type came from Chimborazo, Ecuador.

Pallidus (*Myotis californicus*) Stephens, Proc. Biol. Soc. Washington, vol. 13, p. 153, June 13, 1900. This is the pale race of *Myotis californicus* inhabiting the more arid parts of the Southwest. The type came from Vallecito, San Diego County, Calif.

Parvulus (*Vespertilio*) Temminck, Monogr. de Mamm., vol. 2, p. 246, 1840. Dobson states that he directly compared Temminck's type of *Vespertilio parvulus* in the Leiden Museum with an alcoholic specimen of *Myotis nigricans* and considered them as representatives of one species. The type was collected by Natterer in Brazil.

Peninsularis (*Myotis*) Miller, Ann. and Mag. Nat. Hist., ser. 7, vol. 2, p. 124, 1898. This is the only name which has been applied to the small form of *Myotis velifer* inhabiting Lower California.

Pernox (*Myotis*) Hollister, Smithsonian Misc. Coll., vol. 56, No. 26, p. 4, December 5, 1911. The specimen on which this name was based proves to be a large, richly colored individual of *M. lucifugus alascensis.* It was collected at Henry House, Alberta, Canada.

Pilosus (*Vespertilio*) Peters, Monatsber. k. Akad. Wiss. Berlin, 1869, p. 403. The origin of the wings from the tibia and from the middle of the back close to the spine, as well as the very large size of the foot, are characters so different from those of any other American member of the genus, and so like those of the Philippine *Myotis macrotarsus*, that until the occurrence in South America of an animal possessing these peculiarities can be established by the discovery of a second specimen, it is difficult to avoid the conclusion that the type probably came from the Far East rather than, as supposed, from Montevideo, Uruguay.

Polythrix (*Vespertilio*) I. Geoffroy, Ann. des Sci. Nat., ser. 1, vol. 3, p. 443, 1824. There is little in the original description that would certainly identify this bat, which in size is said to be slightly larger than the common pipistrelle of Europe, its color "brun-marron très foncé" above; below, the same with a slight touch of grayish; forearm 38 mm. The original specimens were sent from southern Brazil with others from Rio Grande do Sul and Minas Geraes. Gervais examined the types in 1855 and referred them to *Myotis* (as a subgenus) since they appeared to have teeth back of the canines. He describes their pelage as "brun, légèrement nuancé de roussâtre." The color and size indicate that they are specimens of *Myotis ruber*, to the synonymy of which the name *polythrix* may therefore be referred.

Punensis (*Myotis*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 383, July 9, 1914. Four specimens of *Myotis*, two from Puna Island, Ecuador, and two from Daule on the neighboring mainland were regarded by J. A. Allen as distinct from *M. nigricans*. Their somewhat pale color appears to us to be within the limits of individual variation in true *nigricans*.

Quercinus (*Myotis californicus*) H. W. Grinnell, Univ. California Publ. Zool., vol. 12, p. 317, December 4, 1914. Mrs. Grinnell endeavored to restrict the name *M. californicus* to the form of the small-footed brown bat occurring in "that portion of California north of about latitude 36 degrees and west of the desert divides," and applied the new term *quercinus* to the form of southern and southwestern California. Unfortunately, however, Audubon and Bachman's original characterization of the color of *californicus* as "light yellowish brown" hardly applies to those specimens north and west of 36° so well as to those south of it, and Miller in 1897 had already described the darker northwestern animal as *caurinus*. It seems best therefore to regard *quercinus* as a synonym of *californicus*. The type locality is Seven Oaks, San Bernardino County, Calif.

Ruber (*Vespertilio*) E. Geoffroy, Ann. Mus. d'Hist. Nat. Paris, vol. 8, p. 204, 1806. This is the first name applied to the large russet or reddish-brown *Myotis* of South America, the "chauve-souris onzième" of Azara. It is assumed that Azara's description, on which the name is based, was taken from Paraguayan specimens.

Salarii (*Vespertilio*) F. Cuvier, Nouv. Ann. Mus. d'Hist. Nat. Paris, vol. 1, p. 15, 1832. The original description of this bat, based on a specimen sent by Milbert from the vicinity of New York, is not sufficient for a clear determination. Apparently, however, it applies to *Myotis lucifugus*.

Saturatus (*Myotis yumanensis*) Miller, North Amer. Fauna, No. 13, p. 68, October 16, 1897. This is the only name based on the dark subspecies of *yumanensis* inhabiting the humid area of the northwest coast of the United States and British Columbia. The type locality is Hamilton, Skagit County, Wash.

Septentrionalis (*Vespertilio gryphus* var.) Trouessart, Catal. Mamm. viv. foss., p. 131, 1897. Trouessart established this name by latinizing H. Allen's "northern form of *Vespertilio gryphus*" (Monogr. Bats North Amer. (1893), p. 80, March 14, 1894). The animal to which it was applied is the wide-ranging eastern long-eared bat for which the name *Myotis subulatus* has been current during the past 30 years. Say's *Vespertilio subulatus*, 1823, proves to have been not this species but the one which has received the names *leibii*, *ciliolabrum*, *melanorhinus*, *orinomus*, and *winnemana*. As Trouessart's name is the only one which was certainly based on the eastern long-eared *Myotis* it must now be applied to that animal, but in the trinomial form *Myotis keenii septentrionalis*.

Simus (*Myotis*) Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 7, p. 541, June, 1901. This is the first and only name based on a very distinct and peculiar South American species readily distinguishable from all other known members of the genus.

Sociabilis (*Myotis yumanensis*) H. W. Grinnell, Univ. California Publ. Zool., vol. 12, p. 318, December 4, 1914. This is the dull brownish race of the large-footed *M. yumanensis*, inhabiting the semiarid region of the western United States, from Montana to the eastern part of the Pacific Coast States. The type locality is Fort Tejon, Calif.

Spixii (*Vespertilio*) Fischer, Synopsis Mamm., p. 111, 1829. This name was proposed as a substitute for *Vespertilio brasiliensis* of Spix, 1823 (not of Desmarest, 1822). It is with little doubt a synonym of Wied's *V. nigricans* published three years previously.

Subulatus (*Vespertilio*) Say, Long's Exped. to the Rocky Mountains, vol. 2, p. 65, footnote, 1823. The specific name *subulatus* has been misapplied since 1864 to the common long-eared *Myotis* of eastern North America by practically all writers who have recognized the animal as a distinct species. Recently accumulated evidence shows, however, that it must now be restored to a different and still imperfectly known bat; that is, to the animal which, since its original discovery by Say, has received in its several subspecific forms, the names *leibii* (1842), *ciliolabrum* (1886), *melanorhinus* (1890), *orinomus* (1903), and *winnemana* (1913). The reason for this change is twofold: First, the type locality of *Vespertilio subulatus*, on the Arkansas River near the present town of La Junta, Otero County, southeastern Colorado, is outside of the known range of the eastern long-eared bat, and second, the original description, when read with specimens of the eastern animal and of those species actually known to occur in Colorado at hand for comparison, is immediately seen to apply much less to the former than to a definite one of the latter, namely, the bat on which Merriam based the name *ciliolabrum* in 1886.

Tenuidorsalis (*Vespertilio*) H. Allen, Proc. Acad. Nat. Sci. Philadelphia, p. 283, 1866. An examination of the type (from Cape St. Lucas, Lower California) shows that the specimen on which this name was based, is identical with *Myotis californicus*.

Thomasi (*Myotis*) Cabrera, Bol. Soc. Españ. Hist. Nat., Madrid, vol. 1, p. 370, 1901. The structural characters ascribed to this bat convince us that the name applies to the subspecies of *M. chiloënsis* occurring in the Andean region from northern Ecuador to Bolivia which Peters had previously called *Vespertilio oxyotus*.

Thysanodes (*Myotis*) Miller, North Amer. Fauna, No. 13, p. 80, October 16, 1897. This is the tenable name for the large *Myotis* with long ears and well-fringed interfemoral membrane occurring in the western United States and Mexico. The type locality is Old Fort Tejon, Calif.

Velifer (*Vespertilio*) J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 3, p. 177, December 10, 1890. This is the name of the large drab-gray *Myotis* with large foot, common in the southwestern United States and through Mexico to Guatemala. The type locality is Guadalajara, Jalisco, Mexico.

Virginianus (*Vespertilio*) Audubon and Bachman, Journ. Acad. Nat. Sci. Philadelphia, ser. 1, vol. 1, p. 93, 1841. This is undoubtedly a synonym of *Myotis lucifugus*. The original description and measurements apply fairly well to that species and the characteristic dark shoulder spot is especially mentioned. The specimen came from the "mountains of Virginia," where *M. lucifugus* is common.

Volans (*Vespertilio*) H. Allen, Proc. Acad. Nat. Sci. Philadelphia, p. 282, 1866. The correct disposition of this name remained for nearly fifty years unsettled. It was originally applied to a bat from Cape St. Lucas, Lower California, but the description was quite inadequate, and its author subsequently considered it a synonym of his *Vespertilio nitidus*. Miller later placed both names in the synonymy of *Myotis californicus;* but the rediscovery of the type and its examination by Goldman in 1914 proved *volans* to be the first name applicable to the short-eared, long-legged *Myotis* of western North America, then currently known as *M. longicrus*. The name *Myotis volans* is therefore tenable in a specific sense, while *longicrus* remains available for the dark race of the humid northwest coast.

Winnemana (*Myotis*) Nelson, Proc. Biol. Soc. Washington, vol. 26, p. 183, August 8, 1913. This name was given to the small-footed, black-faced bat, with keeled calcar, inhabiting the eastern United States (type from Plummer Island, Md.). It is, however, a synonym of *Vespertilio leibii* based by Audubon and Bachman on a specimen from Ohio many years before, a name whose allocation has long been misunderstood on account of the apparent rarity of the animal to which it was applied.

Yumanensis (*Vespertilio*) H. Allen, Smithsonian Misc. Coll., No. 165, p. 58, June, 1864. This name, based on specimens from Fort Yuma, Calif., is the first one applied to the small, large-footed *Myotis* of the western United States and Mexico.

THE GENERA MYOTIS AND PIZONYX AND THEIR AMERICAN SPECIES

Genus MYOTIS Kaup

Myotis Kaup, Skizzirte Entw.-Gesch. u. Natürl. Syst. d. Europ. Thierw., vol. 1, p. 106, 1829.—Miller, Ann. and Mag. Nat. Hist., ser. 6, vol. 20, p. 382, October, 1897; North Amer. Fauna, No. 13, p. 55, October 16, 1897.—Trouessart, Catal. Mamm. viv. foss.. p. 1283, 1899.—Miller, Key Land Mamm. Northeastern North Amer., Bull. New York State Mus., vol. 8, No. 38 (October, 1900), p. 148, November 21, 1900.—Elliot, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 400, March, 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901.—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 255, December 27, 1901.—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 570, 1904.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 89, 1904.—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 473, 1905.—Miller, Fam. and Gen. Bats, Bull. U. S. Nat. Mus., No. 57, p. 200, June 29, 1907; List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 54, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 68, April 29, 1924.

Nystactes Kaup, Skizzirte Entw.-Gesch. u. Natürl. Syst. d. Europ. Thierw., vol. 1, p. 108, 1829 (*bechsteinii*). Not *Nystactes* Gloger, 1827.

Leuconoë Boie, Isis, p. 256, 1830 (Die Wasserfledermäuse, a group defined by Boie in Isis, 1825, p. 1206, as including *Vespertilio daubentonii*, *V. nattereri*, *V. dasycneme*, and *V. mystacinus*).—Dobson, Monogr. Asiat. Chiropt., p. 126 (subgenus of *Vespertilio*=*Myotis* including *dasycneme* and *daubentonii* of Boie's original species. No type designated); Catal. Chiropt. Brit. Mus., p. 289, 1878 (subgenus of *Vespertilio*=*Myotis*).—Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 13, p. 382, May, 1904 (subgenus of *Myotis; M. daubentonii* selected as type); Journ. Bombay Nat. Hist. Soc., vol. 23, p. 607, 1915 (genus).

Vespertilio Keyserling and Blasius, Wiegmann's Archiv für Naturgesch., 1839, vol. 1, p. 306 (not of Linnaeus, 1758).—H. Allen, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 46, June, 1864.—Dobson, Catal. Chiropt. Brit. Mus., p. 284, 1878.—H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 70, March 14, 1894.

Selysius Bonaparte, Iconografia della Fauna Italica, Introd., p. 3, 1841 (*Vespertilio mystacinus*).

Capaccinius Bonaparte, Iconografia della Fauna Italica, Indice Distrib., p. 1, 1841 (*Vespertilio capaccinii*).

Trilatitus Gray, Ann. and Mag. Nat. Hist., p. 258, December, 1842 (*Vespertilio hasseltii*, *V. macellus*=*adversus*, and *V. blepotis*=*Miniopterus* sp.).

Tralatitus Gervais, Dict. Univ. d'Hist. Nat., vol. 13, p. 213, 1849 (Modification of *Trilatitus* Gray, 1842).

Brachyotus Kolenati, Allgem. deutsch. Naturhist. Zeitung, Dresden, new ser., vol. 2, p. 131, 1856 (*Vespertilio mystacinus*, *V. daubentonii*, and *V. dasycneme*). Not *Brachyotus* Gould, 1827.

Isotus Kolenati, Allgem. deutsch. Naturhist. Zeitung, Dresden, new ser., vol. 2, p. 131, 1856 (*Vespertilio nattereri* and *V. emarginatus*).

Tralatitius Gray, Ann. and Mag. Nat. Hist., ser. 3, vol. 17, p. 90, February, 1866. (Modification of *Trilatitus* Gray, 1842.)

Pternopterus Peters, Monatsber. k. preuss. Akad. Wissensch., Berlin, p. 706, 1867 (subgenus of *Vespertilio*=*Myotis*, type, *V. lobipes* Peters=*Vespertilio muricola* Hodgson).

Exochurus Fitzinger, Sitzungsber. kais. Akad. Wissenesch., Wien, math.-naturwissensch. Classe, vol. 62, p. 75, 1870 (*Vespertilio macrodactylus*, *V. horsfieldii*=*V. adversus*, and *V. macrotarsus*.)

Aeorestes Fitzinger, Sitzungsber. kais. Akad. Wissensch., Wien, math.-naturwissensch. Classe, vol. 62, p. 427, 1870 (*Vespertilio villosissimus*, *V. albescens*, and *V. nigricans*).

Comastes Fitzinger, Sitzungsber. kais, Akad. Wissensch., Wien, math.-naturwissensch. Classe, vol. 62, p. 565, 1870 (*Vespertilio capaccinii*, *V. megapodius*, *V. dasycneme*, and *V. limnophilus*).

Euvespertilio Acloque, Faune de France, Mammifères, p. 38, 1899 (*Vespertilio emarginatus*, *V. mystacinus*, *V. murinus*=*myotis*, *V. nattereri*, and *V. bechsteinii*).

Rickettia Bianchi, Ann. Mus. Zool. Acad. Sci., St. Petersburg, vol. 21, p. lxxviii, 1916 (*Vespertilio ricketti*).

Dichromyotis Bianchi, Ann. Mus. Zool. Acad. Sci., St. Petersburg, vol. 21, p. lxxviii, 1916 (*Vespertilio formosus*).

Paramyotis Bianchi, Ann. Mus. Zool. Acad. Sci., St. Petersburg, vol. 21, p. lxxix, 1916 (*Vespertilio bechsteinii*).

Genotype.—*Vespertilio myotis* Borkhausen.

Characters.—Vespertilionine bats with the maximum known number of teeth present, the dental formula: $i\frac{2-2}{3-3}$, $c\frac{1-1}{1-1}$, $pm\frac{3-3}{3-3}$, $m\frac{3-3}{3-3}=38$; sternum, skull, teeth, and external characters primitive for the group, none of them presenting any features of unusual specialization.

Distribution.—Entire mainland of the Eastern and Western Hemispheres to the limits of tree growth; on the larger islands the range extends to Japan, the British Islands, Newfoundland, Madagascar, the Philippines, Samoa, and Australia, and, from South America, to the southern Lesser Antilles.

Remarks.—The bats of the genus *Myotis* constitute the most extensively distributed of any comparable group of land mammals. Its range is approached in area by that of only two other genera, the nearly related *Eptesicus* and *Pipistrellus*. A seeming anomaly in distribution is the fact that the range is not yet known to include the Greater Antilles. There is no unlikelihood, however, that further research may show that some inconspicuous member of the genus actually inhabits one or more of these islands or that the remains of an extinct representative may be found as part of the imperfectly known fauna whose traces have been left in the caves. Coincident with this almost universal distribution is a notably generalized type of structure. The family Vespertilionidæ, it is true, stands high among the bats in the development of those general characters which distinguish the Chiroptera from nonvolant mammals; but within the family the genus *Myotis* is conspicuous for the retention of the most primitive dental formula—lacking only one upper incisor, one upper premolar, and one lower premolar of the complete eutherian armature—and for the absence of the specialized features of cranial structure and individual tooth form which characterize many of the bat genera with limited range. More than 100 forms of *Myotis* have been described. Thus the genus is one of the largest as well as the most widely distributed of the entire order. For the most part the species do not differ conspicuously from each other. They are seldom noticeable in color and usually small in size.

It is probable that a further study of these bats will show the desirability of arranging them in several genera and subgenera. Thomas (1915) has already used *Leuconoë* as a genus. At about the same time (1916), Bianchi, dealing with the Siberian members of the genus, applied the name *Capaccinius*, in a generic sense, to a group containing the species *capaccinii*, *dasycneme*, *longipes*, *taiwanensis*, *pequinius*, and *ricketti* (the last of which he separated subgenerically as *Rickettia*). In the genus *Myotis* proper he recognized, in addition to the typical group, the subgenera *Dichromyotis*, *Pternopterus*, *Paramyotis*, *Isotus*, and *Selysius*. We have shown (p. 9) that the *Myotis myotis* group has rather important dental characters which may prove to separate it definitely from the rest of the genus; but, in our opinion, no final results can be attained without a detailed study of the species inhabiting all parts of the world.

A satisfactory arrangement of the descriptions which follow would require that the least specialized members of the genus be first dealt with, then those showing successively wider departure from a generalized condition. Such an ideal method is impracticable, however, on account of the varying degree of development shown by the structural characters in the different species. Thus in *Myotis lucifugus*, though the ears are not unusually long, the feet are relatively large, while in *M. californicus* the ears are elongated and the feet small; again in *M. keenii* (=*subulatus* of recent authors) the feet are nearly as large as in *M. lucifugus* but the ears are conspicuously lengthened. In *Myotis thysanodes*, the species with the most aberrant condition of the molar cusps, the general structure shows no very high specialization. In other words, the different parts of the body vary independently, so that there is seldom an obvious correlation between their degrees of development from one species to another. We have consequently not been able to find any recognizably different general totals of specialization for the members of the group as compared with one another, or any main line of modification along which the evolution of the American species has progressed. Since a linear arrangement which would represent a natural sequence is thus clearly out of the question, for the present at least, the order of enumeration which we have chosen is in the main an arbitrary one. It begins with the longest-known and most wide-ranging American species, *Myotis lucifugus*, as a fairly generalized representative of the genus. The other large-footed species follow, then those with small foot and keeled calcar. Finally we have found it convenient to give separate treatment to the tropical and South American members of the genus. There is practically no overlapping of the ranges of these and of the forms which occur in temperate North America; furthermore they are much less completely known.

Genus PIZONYX Miller

Pizonyx MILLER, Proc. Biol. Soc. Washington, vol. 19, p. 85, June 4, 1906; Fam. and Gen. Bats, Bull. U. S. Nat. Mus., No. 57, p. 202, June 29, 1907; List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 59, December 31, 1912.—ELLIOT, Check-List Mamm. North Amer., suppl., p. 157, 1917.—MILLER, List Recent Mamm. North Amer. 1923, Bull. U. S. Nat. Mus., No. 128, p. 73, April 29, 1924.

Genotype.—Myotis vivesi Menegaux.

Characters.—Like *Myotis* but foot so enlarged that, with the claws, it about equals the length of the tibia; toes and claws so greatly compressed that the width of claw is only about one-eighth the height of the claw at base; wing membrane abruptly narrowed in region of knee; a large glandular mass in wing membrane near middle of forearm; teeth showing a general tendency to heightening of cusps; second premolar, both above and below, larger than first.

Distribution.—Islands and coast of the Gulf of California, Mexico.

Remarks.—The genus *Pizonyx*, though nearly related to *Myotis*, is well differentiated by the remarkable development of the foot, and by the other characters which have just been mentioned. In size and general appearance, apart from the enlarged feet, the single known species of *Pizonyx* bears a resemblance to *Myotis myotis* of the palearctic region. This resmblance is, however, purely superficial. That *Pizonyx* can not have been derived from some member of the *Myotis myotis* group is shown by its retaining the normally developed m^3, whereas a reduction of this tooth is one of the main characteristics of *M. myotis* and its allies (see p. 10).

KEY TO THE AMERICAN SPECIES AND SUBSPECIES OF MYOTIS AND PIZONYX

Foot greatly enlarged, its length about equal to that of tibia or skull, the digits and claws conspicuously compressed; wing membrane abruptly narrowed at level of knee; a glandular mass in membrane between forearm and fifth digit; second premolar, both above and below, larger than first. **Pizonyx** (p. 33).

  Size large, exceeding that of any known American species of *Myotis;* forearm 60 mm. or more; greatest length of skull about 22 mm. (Gulf of California)------------------------------------**P. vivesi** (p. 209).

Foot not greatly enlarged, its length decidedly less than that of tibia or skull; the digits and claws not conspicuously compressed; wing membrane not narrowed at level of knee; no glandular mass in membrane between forearm and fifth digit; second premolar, both above and below, smaller than first [size in the known American species medium or small; forearm not known to attain a length of 60 mm.]----------------------**Myotis** (p. 30).

SPECIES OCCURRING IN TROPICAL AND SOUTH AMERICA

Wing from tibia and sides of back close to the median line ("Uruguay" but probably not American)------------------------------**M. pilosus** (p. 208).

Wing from foot and sides of body.

  Breadth of rostrum across canines equal to or greater than interorbital constriction; wing attached at ankle-----------------**M. simus** (p. 205).

  Breadth of rostrum across canines less than interorbital constriction; wing attached at base of outer toe.

    Maxillary cheek teeth unusually small relatively to area of palate; skull with rostrum shortened and brain case enlarged and rounded. **M. albescens** (p. 200).

    Maxillary cheek teeth not unusually small relatively to area of palate; skull with normal rostrum and brain case.

      A well developed sagittal crest always present in adults; color usually reddish--------------------------------------**M. ruber** (p. 197).

      A well developed sagittal crest rarely present in adults; color seldom reddish.

        Skull small, its greatest length usually ranging from 13 to 14.5; teeth small, the crown of m^2 usually less than 1.25 by 1.70 mm.; ear usually not extending beyond nostril when laid forward. **M. nigricans** (p. 175).

          Greatest length of skull usually more than 14 mm.; foot usually less than half as long as tibia--------------**M. n. nigricans** (p. 177).

          Greatest length of skull never as much as 14 mm.; foot usually more than half as long as tibia.

            Skull extremely small; forehead rising with unusual abruptness. **M. n. dominicensis** (p. 183).

            Skull not extremely small; forehead rising normally.

              Color probably averaging darker (southern Mexico). **M. n. extremus** (p. 181).

              Color probably averaging lighter (Island of Curaçao). **M. n. nesopolus** (p. 182).

        Skull large, its greatest length usually ranging from 14 to 16 mm.; teeth large, the crown of m^2 usually more than 1.30 by 1.70 mm.; ear always extending beyond nostril when laid forward. **M. chiloënsis** (p. 189).

General color grayish **M. c. atacamensis** (p. 192).

General color not grayish.

Size large, greatest length of skull usually more than 15 mm. **M. c. alter** (p. 194).

Size medium, greatest length of skull usually less than 15 mm.

Color distinctly yellowish **M. c. dinellii** (p. 191).

Color dark brown.

Burnished tips of hairs on back rather conspicuous. **M. c. oxyotus** (p. 193).

Burnished tips of hairs on back obsolete. **M. c. chiloënsis** (p. 190).

SPECIES OCCURRING IN TEMPERATE NORTH AMERICA

Under side of wing furred to level of elbow; skull with rostrum shortened and occiput unusually elevated (western North America) **M. volans** (p. 135).

Size small, forearm about 35 mm., length of skull less than 13 mm. (Lower California) **M. v. volans** (p. 139).

Size larger, forearm 37–40 mm.; length of skull more than 13 mm.

Color buffy or ochraceous (interior of western United States). **M. v. interior** (p. 142).

Color dark brown.

Upper parts dark reddish brown (northwest coast region). **M. v. longicrus** (p. 140).

Upper parts ochraceous tawny (southern Mexico) **M. v. amotus** (p. 145).

Under side of wing not furred to level of elbow; skull with normal rostrum and occiput.

Foot small, the ratio of its length to that of tibia usually ranging from about 40 to 46.

Hairs of back with long shiny tips; third metacarpal not so long as forearm; skull larger, with flattened braincase and gradually rising profile (United States) **M. subulatus** (p. 164).

Belly warm buff, back ochraceous tawny (eastern United States). **M. s. leibii** (p. 171).

Belly whitish.

Upper parts very pale, light buff to warm buff (Interior United States). **M. s. subulatus** (p. 168).

Upper parts less pale, bright golden above (southwestern United States) **M. s. melanorhinus** (p. 169).

Hairs of back dull-tipped; third metacarpal usually as long as forearm; skull smaller, with rounded brain case and abruptly rising profile (Mexico and western United States) **M. californicus** (p. 148).

Size larger, forearm usually 33.6 to 36 mm. (southern Mexico). **M. c. mexicanus** (p. 159).

Size smaller, forearm usually 30 to 34 m.

Fur of back distinctly tricolor, the hairs with a dark base succeeded by a pale ring and a pale reddish tip (deserts of western United States) **M. c. pallidus** (p. 157).

Fur of back not distinctly tricolor.

Upper parts ochraceous tawny (western United States). **M. c. californicus** (p. 151).

Upper parts nearly mahogany red (northwest coast region). **M. c. caurinus** (p. 155).

Foot normal or large, the ratio of its length to that of tibia usually ranging from about 48 to 60.

Wing membrane attached to tarsus; fur of back without obviously darkened basal area; ratio of foot to tibia usually about 60 (Indiana and Illinois to Alabama and Georgia)______________________**M. grisescens** (p. 80).

Wing membrane attached to side of foot; fur of back with obviously darkened basal area; ratio of foot to tibia usually less than 57.

Fur of back with an obvious tricolor pattern; calcar usually with a small but evident keel (eastern United States)________**M. sodalis** (p. 130).

Fur of back without an obvious tricolor pattern; calcar normally with no trace of keel.

Ear when laid forward extending noticeably beyond tip of muzzle.

Free border of uropatagium with inconspicuous, scattered, stiff hairs (central and northern North America)______**M. keenii** (p. 101).

Color darkened; a saturate northwest coast form.
M. k. keenii (p. 104).

Color normal; a normal eastern and central form.
M. k. septentrionalis (p. 105).

Free border of uropatagium usually with a noticeable fringe of stiff hairs.

Size larger, forearm usually 41 to 46 mm.; ear not exceptionally enlarged; fringe conspicuous (Mexico and western United States)_______________________________**M. thysanodes** (p. 122).

Under parts whitish, upper parts "warm buff" (western United States and northern Mexico)______**M. t. thysanodes** (p. 126).

Under parts buffy, upper parts darker, "tawny olive" (southern Mexico)____________________________**M. t. aztecus** (p. 128).

Size smaller, forearm usually 33 to 40 mm.; ear exceptionally enlarged; fringe not conspicuous (western United States and northern Mexico).

Skull with noticeably flattened brain case; forearm 33 to 36 (San Pedro Martir Mountains, Lower California).
M. milleri (p. 118).

Skull with normal brain case; forearm usually 37 to 40.
M. evotis (p. 111).

Upper parts darker, near clay color (northwest coast region).
M. e. evotis (p. 114).

Upper parts lighter, flaxen or cinnamon buff (range of the species except northwest coast region).
M. e. chrysonotus (p. 116).

Ear when laid forward not extending noticeably beyond tip of muzzle.

Cheek teeth robust, the breadth of the maxillary molars, as compared with that of the intervening palate, greater than usual in American members of the genus.

Brain case flattened; pelage glossy (southwestern United States).
M. occultus (p. 97).

Brain case highly arched; pelage dull________**M. velifer** (p. 86).

Color darker (Mexico and western United States).
M. v. velifer (p. 89).

Color paler.

Size maximum for the species; greatest length of skull 15.8 to 17.6 mm. (Kansas, through Texas and New Mexico, to Durango)------------------------**M. v. incautus** (p. 92).

Size minimum for the species; greatest length of skull 14.2 to 15.6 mm. (Lower California---**M. v. peninsularis** (p. 93).

Cheek teeth normal, the breadth of the maxillary molars as compared with the intervening palate not greater than usual in American members of the genus.

Fur above dense, wooly; a low but evident sagittal crest always present in adults (Florida; Indiana; Saskatchewan?). **M. austroriparius** (p. 76).

Fur above normal, silky; a sagittal crest rarely present.

Forearm ranging from 32 to 37 mm.; greatest length of skull ranging from 13.2 to 14.2 mm.; hairs of back without conspicuous burnished tips (western North America). **M. yumanensis** (p. 61).

Color paler.

Above pale buffy, below almost white (deserts of Great Basin)----------------------**M. y. yumanensis** (p. 65).

Above tawny olive, below dull whitish, tinged with buffy (western United States)--------**M. y. sociabilis** (p. 68).

Color darker.

Membranes and ears blackish brown, fur dull sepia above (northwest coast)-------------**M. y. saturatus** (p. 70).

Membranes and ears dull brownish, fur dark cinnamon brown above (southern Mexico)---**M. y. lutosus** (p. 72).

Forearm ranging from 36 to 40 mm.; greatest length of skull ranging from 14.3 to 15.3 mm.; hairs of back with conspicuous burnished tips (North America in general). **M. lucifugus** (p. 38).

Small premolars unusually crowded (Mexico and western Texas)---------------------------**M. l. fortidens** (p. 54).

Small premolars not unusually crowded.

Color above ranging from blackish to very dark brown (northwest coast)-------------**M. l. alascensis** (p. 47).

Color not ranging from blackish to very dark brown.

Belly with a distinct buffy wash; membranes not edged with white (region east and north of Rocky Mountains)-----------------------**M. l. lucifugus** (p. 43).

Belly whitish; membranes edged with white.

General color above cinnamon buff, ears black, edges of membranes often whitish (semiarid western United States)--------------**M. l. carissima** (p. 50).

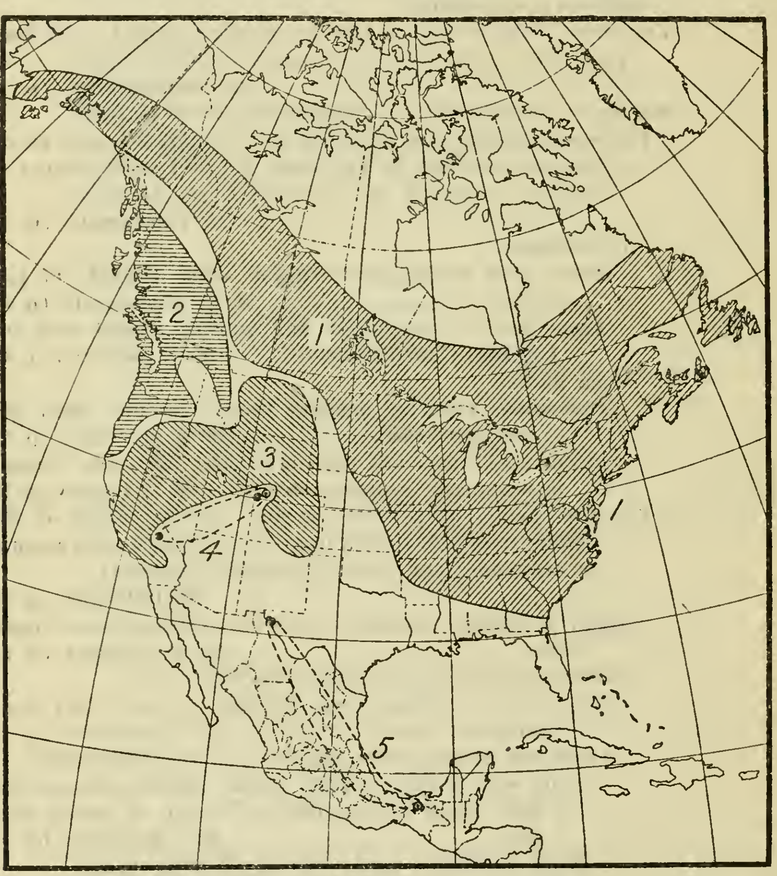
General color above pale pinkish buff, ears pale brownish (Great Basin)------------**M. l. phasma** (p. 53).

I. SPECIES OF MYOTIS OCCURRING IN TEMPERATE NORTH AMERICA

MYOTIS LUCIFUGUS (LeConte)

(Synonymy under subspecies)

Distribution.—From the limit of tree growth in Labrador, Canada, and Alaska, southward to Tabasco, Mexico.



Map 1.—Distribution of Myotis lucifugus; 1, M. lucifugus lucifugus; 2, M. lucifugus alascensis; 3, M. lucifugus carissima; 4, M. lucifugus phasma; 5, M. lucifugus fortidens

Diagnosis.—Size medium among the American species; forearm about 38 (36 to 40) mm.; total length usually about 80 to 86 mm., tail about 36 mm., averaging 45 per cent of the total length (average ratio of tail to head and body in 10 specimens from Nova Scotia, 77.8; in 10 from Montana, 76.2; in 10 from the northwest coast, 75.8); greatest length of skull ranging from 14.0 to 15.8; maxillary tooth row ranging from 5.0 to 5.8 mm.; lower tooth row (excluding incisors) usually more than 5.6 (5.4 to 6.2); ear reaching nostril when laid forward, its height from meatus usually 13 to 15 mm.; wing from the side of foot, which is large, exceeding one-half the tibia (ratio of foot to tibia ranging from about 53 to about 55.7); calcar without keel; hairs of back with long glossy tips which impart to the pelage a conspicuous metallic sheen. Skull with gradually rising forehead and broad brain case which is usually not provided with a distinct sagittal crest. Upper molars with full complement of secondary cusps and ridges, but with a narrow, inconspicuous and sometimes incomplete cingulum on inner border of crown.

Ears.—The ear is of moderate length, when laid forward reaching to the nostril; its anterior edge is convex, becoming nearly straight in the upper third to the bluntly rounded tip; below the tip the external margin is slightly concave or nearly straight in the upper half, then convex in the lower half which forms a projecting, but not abrupt, shoulder. The tragus is about half the total height of the ear (8:15 mm.). At its outer base is a small rounded lobe, marked off by a shallow notch. Above this point and opposite the inner base is the widest region. The inner margin of the tragus is nearly straight, the outer very slightly convex, and faintly crenulate to the narrowly rounded tip.

Wing and membranes.—The wing membrane arises from the side of the foot near the distal end of the metatarsal. The third to fifth metacarpals are graduated, the third longest, the fourth slightly shorter, the fifth still shorter. The basal phalanges and total length of the digits are likewise graduated in the same order. Taking the third finger as 100, the fourth and fifth fingers are, respectively, as 86 and 80 (60:52:48 mm.). When folded, the third metacarpal usually falls short of the elbow by about 2.5 mm. The extreme tip of the tail is free. Uropatagium with minute hairs along the free border. These hairs are few and widely scattered, very inconspicuous.

Foot.—The foot is rather large, the ratio of its length to that of the tibia ranging from about 53 to nearly 56. Calcar long (about 17 mm.), exceeding in length the free border of the interfemoral membrane, terminating in a minute lobule; its free edge quite without indication of a keel. Outer toe a little shorter than the others. A slight web between bases of toes; terminal joints with a few very small stiff hairs.

Fur and color.—The pelage is rather full, but not fleecy, long and fine above, the longer hairs attaining a length of about 9 to 10 mm. On the ventral surface of the wing membrane the fur extends thinly from the knee to the distal three-fourths of the humerus. The interfemoral membrane is thinly haired about to a line joining the knees. Characteristic are the long glossy tips of the dorsal hairs which may completely conceal the dark bases and give a uniformly shining appearance to the coloration of the upper side. In a well-made skin, this glossy sheen to the fur is usually sufficient in itself to separate the species from others with which it occurs. A dark shoulder spot is usually present.

Skull.—The skull, viewed from above (pl. 1, p. 7, fig. 12), has the rostrum relatively short (distance from anterior margin of alveolus of inner incisor to narrowest part of interorbital constriction decidedly less than that from narrowest part of constriction to lambda) and narrow (maxillary breadth at m^3 usually more than 1 mm. less than breadth of brain case); anterior breadth across roots of canines obviously less than interorbital constriction, and the forehead, as seen in profile, has a slight gradual upward slope. The brain case is somewhat flattened and subcircular in dorsal view, its area noticeably greater than that of rostrum. Even in adults the sagittal crest is seldom developed (see footnote, p. 133), though it is sometimes indicated by a low median ridge, which, posteriorly at least, is narrow and sharply defined. The lambdoid crests usually do not quite meet at the vertex.

Teeth.—The teeth are of normal size relatively to the rostum and palate (pl. 1, p. 7, fig. 3*b*). Length of maxillary tooth row less than greatest palatal width across molars. Upper molars with full maximum development of secondary cusps and ridges (fig. 1*a* and 1*c*, p. 8), the protoconule always present and well developed, the hypocone with base well marked off from that of the protocone and with apex sometimes distinct from the inner loph; cingulum variable in its development, usually obvious on lingual margin of crown, but rarely if ever continuous around the antero-lingual face of the protocone; exceptionally the cingulum may be almost or quite absent. The two small upper premolars are usually somewhat drawn inward from the tooth row, but the tips of both teeth are visible from the outer side.

Remarks.—As a species *Myotis lucifugus* has a broader area of dispersal than any other member of its genus in the Western Hemisphere. Over an astonishingly wide range it holds its structural characters very closely, with remarkably little variation in size and proportions. In color, however, it shows the usual response to differences in climate, tending to become dark in areas of high humidity and pallid under conditions of dryness. It is usually associated with at least moderate tree growth and particularly delights to feed along small water courses in the forest. It is therefore less common in our arid Southwest, if not altogether absent from areas of actual desert conditions; in such places it is outnumbered by the smaller, duller-colored *M. yumanensis.* In many localities, however, the two species occur together along the borders of thinly wooded country, and

Allen collected local forms of both at the same spot by an alpine stream at the limit of trees, 11,000 feet, on Mount Whitney, California. At this locality the animals were probably summer invaders from lower altitudes, *M. yumanensis* perhaps from the desert at the east base of the Sierra, whence additional examples were later obtained. *Myotis lucifugus* is a social species, breeding in colonies, sometimes in caves, frequently in dark recesses of buildings. It winters in caves in the temperate parts of its range.

Throughout eastern North America this is by far the commonest species of *Myotis*, but in western North America it is less abundant, especially at lower elevations and in desert country.

In the Eastern Hemisphere *Myotis lucifugus* is represented by *Myotis daubentonii.* The only external characters by which true *Myotis daubentonii* and the larger footed forms of *M. lucifugus* can with certainty be distinguished appear to be that in European specimens (*a*) the toes are elongated and the claws distinctly enlarged, (*b*) the insertion of the wing membrane is rather on the basal than the terminal half of the metatarsus, and (*c*) the fur of the upperparts is not conspicuously glossy and the color of the underparts is more contrastedly paler than that of the back. The skulls of the two species are alike in size and in all essential characters; but in typical *M. daubentonii* the dorsal profile from the middle of the brain case backward tends to be evenly convex, while in *M. lucifugus* there is usually some indication of a concavity at front of occiput, the extreme posterior region tending to rise a little above level of middle of brain case. We have not been able to find any tangible differences between the teeth of the two animals (compare teeth of *M. daubentonii*, figured by Miller,[5] and those of *M. lucifugus*, figured by H. Allen).[6] The resemblance between the two species was noted by H. Allen in 1894,[7] but we have not seen it mentioned by any other recent author.

The occurrence of *Myotis lucifugus* in Kamchatka was recorded by Hahn in 1905[8] on the basis of a specimen in alcohol (No. $\frac{11189}{37449}$ U. S. Nat. Mus.) collected at Petropavlovsk by Mr. F. Whymper and brought to Washington by Dr. W. H. Dall. (It was entered in the catalogues Jan. 10, 1873). Another individual, not mentioned by Hahn, was taken by Grebnitzki at the same place in July, 1889 (No. 155523 U. S. Nat. Mus.). Both specimens are in poor condition and neither of them has a perfect skull. After careful examination we are unable to distinguish them, on the basis of the characters which they show, from *M. lucifugus.* There is a strong probability, however, that they represent the animal which Ognev has recently described from Vladivostok as *Myotis daubentonii ussuriensis*,[9] and in the absence of more complete evidence we prefer not to regard their presence in Kamchatka as undoubted proof that an American bat has extended its range into the Old World.

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[5] Cat. Mammals Western Europe, Brit. Mus., p. 186, Nov. 23, 1912.

[6] Monogr. Bats North Amer. (1893), pl. 11, Mar. 14, 1894.

[7] Monogr. Bats North Amer., p. 79.

[8] Proc. Biol. Soc. Washington, vol. 18, p. 254, Dec. 9, 1905.

Nomenclature.—Without doubt the earliest tenable name for this species is *lucifugus* LeConte (1831) as pointed out by Miller (1897). The original description, though all too general and brief, applied well enough to this bat, and in a more amplified account, LeConte (1855) made it appear reasonably probable that the species was the common short-eared *Myotis* of the eastern United States, though he supposed that his specimens represented two animals, one of which he wrongly took to be the same as Say's *Vespertilio subulatus.* The British Museum now possesses a skin of the species (No. 7.1.1.534, formerly No. 4741, U. S. Nat. Mus.), received by Tomes many years ago from the Smithsonian Institution. There is no question as to the identity of this specimen, and the original record in the catalogue of the United States National Museum shows that it came directly from LeConte. It was entered as *Vespertilio lucifugus*, but unfortunately without indication of locality. Several writers subsequently characterized supposed new species which can be no other than this bat. Among these forms are three described by F. Cuvier in 1832 (*Vespertilio gryphus*, *V. salarii*, and *V. crassus*), all from "New York;" the first and second sent to Paris by Milbert, the last by Lesueur. The essential parts of the descriptions are much alike, and seem in all probability to refer to slight variations in the same species, allowing for a discrepancy in giving *crassus* only two premolars. Temminck's *Vespertilio carolii*, from Philadelphia and New York, is unquestionably a *Myotis* as shown by the number of teeth; and the rest of the description fits *M. lucifugus* perfectly. Green's *V. domesticus* and Audubon and Bachman's *V. virginianus* appear also to be the same. An immature specimen with supposedly peculiar characters served as the basis for H. Allen's *Vespertilio affinis*, but an examination of the type specimen proves that the name is a synonym of *lucifugus.* LeConte's incorrect identification (1855) of an individual variation in the short-eared species *lucifugus* with the *Vespertilio subulatus* of Say was the cause of much confusion among subsequent authors (H. Allen, 1864, and Dobson, 1878, excepted). Thus the blanket name "*Vespertilio subulatus*" came to be used rather indiscriminately for the two common small brown bats of the eastern United States until the specific distinctness of *Myotis lucifugus* and *M.* "*subulatus*" (=*M. keenii septentrionalis* of the present paper) was finally made clear by Miller in his review of 1897.

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[9] Journ. Mamm., vol. 8, p. 146, May 12, 1927.

MYOTIS LUCIFUGUS LUCIFUGUS (LeConte)

Vespertilio lucifugus LeConte, McMurtrie's Cuvier, Animal Kingdom, vol. 1, appendix, p. 431, 1831; Proc. Acad. Nat. Sci. Philadelphia, vol. 7, p. 436, 1855.—H. Allen, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 55, fig. 51–52, June, 1864.—True, Proc. U. S. Nat. Mus., vol. 7, p. 603, 1885.—Miller, Proc. Boston Soc. Nat. Hist., vol. 28, p. 39, April, 1897.

Vespertilio gryphus F. Cuvier, Nouv. Ann. Mus. d'Hist. Nat. Paris, vol. 1, p. 15, 1832 (New York).—Temminck, Monogr. de Mamm., vol. 2, p. 259, 1840.—H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 75, March 14, 1894 (part).

? *Vespertilio salarii* F. Cuvier, Nouv. Ann. Mus. d'Hist. Nat. Paris, vol. 1, p. 16, 1832 (New York).—Temminck, Monogr. de Mamm., vol. 2, p. 259, 1840.

? *Vespertilio crassus* F. Cuvier, Nouv. Ann. Mus. d'Hist. Nat. Paris, vol. 1, p. 18, 1832 (New York).—Temminck, Monogr. de Mamm., vol. 2, p. 261, 1840.

Vespertilio domesticus Green, Doughty's Cabinet of Nat. Hist., vol. 2, p. 290, 1832 (western Pennsylvania).

? *Vespertilio lanceolatus* Maximilian zu Wied, Reise in das Innere Nord-Amer., vol. 1, p. 364, footnote, 1839 (Bethlehem, Pa.).

Vespertilio carolii Temminck, Monogr. de Mamm., vol. 2, p. 237, 1840 (Philadelphia and New York).—Dobson, Catal. Chiroptera Brit. Mus., p. 325, 1878.—True, Proc. U. S. Nat. Mus., vol 7, p. 603, 1885.

Vespertilio virginianus Audubon and Bachman, Journ. Acad. Nat. Sci. Philadelphia, ser. 1, vol. 1, p. 93, 1841 (mountains of Virginia).

Vespertilio subulatus LeConte, Proc. Acad. Nat. Sci. Philadelphia, 1855, p. 435 (not of Say, 1832).

Vespertilio brevirostris Maximilian zu Wied, Verzeich. beobacht. Säugeth. N. Amer., p. 19, 1860; Arch. f. Naturgesch., 1861, vol. 1, p. 195 (Freiburg, Pa.).

Vespertilio affinis H. Allen, Monogr. Bats North Amer., Smithsonian Misc. Coll, No 165, p. 53, fig. 48–50, June, 1864 (Fort Smith, Ark.).—Lyon and Osgood, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 270, January 28, 1909.

Vespertilio gryphus lucifugus H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 78, March 14, 1894.

Vespertilio albescens affinis H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 93, March 14, 1894.—Trouessart, Catal. Mamm. viv. foss., p. 132, 1897.

Vespertilio gryphus var. *lucifugus* Trouessart, Catal. Mamm. viv. foss., p. 131, 1897.

Myotis lucifugus Miller, North Amer. Fauna, No. 13, p. 59, October 16, 1897.—Trouessart, Catal. Mamm. viv. foss., p. 1284, 1899.—Miller, Prelim. List New York Mamm., Bull. New York State Mus., vol. 6, No. 29 (October, 1899), p. 365, November 18, 1899; Key Land Mamm. Northeastern North Amer., Bull. New York State Mus., vol. 8, No. 38 (October, 1900), p. 149, November 21, 1900.—Elliot, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 402, March, 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901.—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 255, December 27, 1901.—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 580, 1904.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 92, 1904.—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 478, 1905;

Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 504, 1907 (part).—Hahn, Mamm. of Indiana, 33d Ann. Rep. Dept. Geol. and Nat. Resources of Indiana, 1908, p. 621, 1909.—Cory, Mamm. of Illinois and Wisconsin, Field Mus. Nat. Hist., publ. 153, zool. ser., vol. 11, p. 455, 1912 (part).—G. M. Allen, Bull. Mus. Comp. Zool., vol. 52, p. 44, June, 1908.

Myotis lucifugus lucifugus Miller, Key Land Mamm. Northeastern North Amer., Bull. New York State Mus., vol. 8, No. 38 (October, 1900), p. 149, November 21, 1900.—Seton, Life Hist. Northern Anim., p. 1148, 1909.—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 55, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 68, April 29, 1924.—Bailey, North Amer. Fauna, No. 49 [December, 1926], p. 213, January 8, 1927 (North Dakota).

Type locality.—Georgia; probably the LeConte plantation, near Riceboro, Liberty County.

Type specimen.—None designated. The British Museum has a made-over skin received with the Tomes collection, that was originally No. 4741 of the United States National Museum. It is labeled: *Vespertilio* "*lucifugus*," United States, Maj. LeConte. This is a typical *Myotis lucifugus lucifugus* as now understood, and may well be one of the specimens on which LeConte based his original account of the animal.

Distribution.—The entire forested portion of North America north of the southern border of the United States except in the Rocky Mountain region and on the Pacific coast of California, Oregon, Washington, British Columbia, and southern Alaska. (See map 1, p. 38.)

Diagnosis.—Color above ranging from yellowish brown (bronzy) to olive brown; a dark area at the shoulder; belly gray with a rich buffy suffusion; membranes not pale-edged; ratio of foot to tibia usually ranging from about 53 to 54.

Description.—Two extremes or phases of color are found in the east. In the one the fur above is a glossy yellowish brown almost bronze, in the other it is browner (U. S. N. M., No. 159411 from Young Harris, Georgia) nearly "ochraceous-tawny" (of Ridgway, 1912) varying individually in the depth of the bronzy tint to an olive brown (near "Dresden brown"). At the shoulder there is a small contrasting area of darker, nearly blackish brown, forming an ill-defined spot. Bases of the hairs above and below blackish or dark plumbeous. The hairs of the lower surface are tipped with a rich buff, nearly the chamois of Ridgway, those at the extreme posterior part of the body without dark bases. Immature individuals are sooty gray above, the glossy tips of the hairs inconspicuous. Ears and membranes blackish brown.

Measurements.—For measurements see tables, pages 56 and 59.

Specimens examined.—Total number 744, from the following localities:

ALASKA: Anchorage, 1 head (U.S.N.M.); Bristol Bay, 1 alc. (U.S.N.M.); Iliamna Lake, 1 alc. (U.S.N.M.); Kodiak Island, 3 skins, 5 alc. (U.S.N.M.).

ALBERTA: Canadian National Park, 3 skins (A.M.N.H.).

ARKANSAS: no exact locality, 1 alc. (M.C.Z.); Fort Smith, 1 alc., type of *affinis* (U.S.N.M.).

ATHABASCA: Athabasca River, 1 skin (U.S.N.M.).

CANADA: James Bay, 1 alc. (U.S.N.M.).

CONNECTICUT: Greenwich, 1 alc. (U.S.N.M.); New Haven, 1 alc. (U.S.N.M.).

DISTRICT OF COLUMBIA: Washington, 7 skins, 20 alc., 1 skeleton, (U.S.N.M.).

GEORGIA: Young Harris, 1 skin, 1 alc. (U.S.N.M.); no exact locality, 1 alc. (M.C.Z.).

ILLINOIS: Evanston, 1 alc. (M.C.Z.); Golconda, 3 skins (F.M.); Ogle Co., 5 skins (M.C.Z.); Warsaw, 50 alc. (U.S.N.M.); West Northfield, 1 skin (U.S.N.M.).

INDIANA: Bloomington, 2 skins (U.S.N.M.); Coon Cave, 3 skins (U.S.N.M.); Mitchell, 11 skins (U.S.N.M.); Indianapolis, 3 alc. (A.N.S.P.); Wheatland, 3 alc. (U.S.N.M.).

IOWA: Grinnell, 1 skin (M.C.Z.); McGregor, 5 alc. (U.S.N.M.).

LABRADOR: Makkovik, 1 skin (M.C.Z.).

MACKENZIE: Salt River, 1 skin (U.S.N.M.).

MAINE: Cupsuptic River, 1 skeleton (U.S.N.M.); Eastport, 1 alc. (M.C.Z.); Lincoln, 3 alc. (A.N.S.P.); Norway, 3 alc. (M.C.Z); Upton, 1 alc. (M.C.Z.); Waterville, 3 alc. (M.C.Z.).

MANITOBA: Hartney, 1 skin (U.C.); 1 skin (U.S.N.M.); Lake Winnipeg, 1 alc. (B.M.).

MARYLAND: Plummer Island, 1 alc. (U.S.N.M.); Seneca River, 1 alc. (U.S.N.M.).

MASSACHUSETTS: Cambridge, 1 skin (M.C.Z.); Cotuit, 2 skins (M.C.Z.); Harvard, 1 skin (M.C.Z.); Lanesboro, 2 alc. (M.C.Z.); Littleton, 1 skin (M.C.Z.); Wareham, 1 skin (M.C.Z.); Woods Hole, 1 alc. (U.S.N.M.).

MICHIGAN: Charity Island, 10 skins (U.M.); Chippewa Co., 4 skins (U.M.); Douglas Lake, (Cheboygan Co.), 1 skin (U.M.); Isle Royal, Washington Harbor, 10 skins (U.M.); Lake Gogebic, Ontonagon Co., 2 skins, 2 alc. (U.M.); Leland, Leelanau Co., 1 skin (U.M.); Lindsley Lake, Gogebic Co., 5 skins, 2 alc. (U.M.); Little Girl's Pt. (Gogebic Co.), 1 alc. (U.M.); Gogebic County (no exact locality), 2 skins (M.C.Z.); Michigamme, 16 skins (U.S.N.M.); New Baltimore, 8 alc. (U.M.); South Lyon (Oakland Co.), 1 alc. (U.M.).

MINNESOTA: Albert Lea, 1 skeleton (U.S.N.M.); Devil's Lake (Ramsey Co.), 1 alc. (U.M.); Elk River, 9 skins (U.S.N.M.), 2 skins (U.M.); Fort Snelling, 4 skins (U.S.N.M.); Moorhead, 1 skin (U.S.N.M.); Island Lake, Lyon Co., 1 alc. (B.M.).

MISSOURI: Columbia, 5 alc. (U.S.N.M.); Montgomery City, 1 skin, 2 alc. (U.S.N.M.); no exact locality, 82 alc. (M.C.Z.).

NEBRASKA: Fort Pierre, 1 skin (B.M.), 1 skull (U.S.N.M.).

NEW BRUNSWICK: Restigouche, 1 skin (M.C.Z.); Trousers Lake, 1 skin (A.M.N.H.).

NEW HAMPSHIRE: Antrim, 1 skin (M.C.Z.); Laconia, 1 alc. (U.S.N.M.); Shelburne, 2 alc. (M.C.Z.).

NEW JERSEY: Penngrove, 3 alc. (U.S.N.M.); Delaware Water Gap, 1 skin (A.N.S.P.).

NEW YORK: Big Moose Lake, 1 alc. (U.S.N.M.); Catskill Mountains, 2 alc. (U.S.N.M.); Elmsford, 5 skins, 3 alc. (A.M.N.H.), 1 skin (F.M.); Fourth Lake, 1 alc. (U.S.N.M.); Howe's Cave, Schoharie County, 51 alc. (U.S.N.M.); Keene Valley, 1 skin (U.S.N.M.); Lake George, 2 skins, 2 alc. (U.S.N.M.); Locust Grove, 7 alc. (U.S.N.M.); Lyon's Falls, 4 alc. (U.S.N.M.); Oneida Lake, 4 skins (A.N.S.P.); Peterboro, 1 alc. (U.S.N.M.); Salem Center, 3 skins (A.M.N.H.); Stamford, 1 skin (A.M.N.H.); St. Regis Lake, 1 skull (U.S.N.M.); Tupper Lake, 1 skin, 2 alc. (M.C.Z.); Tuxedo, 3 alc. (A.M.N.H.); West Point, 2 alc. (U.S.N.M.); Westport, 1 skeleton (U.S.N.M.); no exact locality, 2 skins (B.M.).

NEWFOUNDLAND: Bay St. George, 4 skins (M.C.Z.); Nicholsville, 4 skins (M.C.Z.).

NORTH CAROLINA: Cherokee, 1 alc. (U.S.N.M.); Roan Mountain, 1 skin (U.S.N.M.); Weaverville, 2 skins (A.M.N.H.); Bertie County, 1 skin (A.N.S.P.).

NORTH DAKOTA: Cannon Ball, 4 skins (U.S.N.M.); Fort Totten, 2 skins (U.S.N.M.); Goodall, 1 skin (U.S.N.M.); Hankinson, 1 skin (U.S.N.M.); Stump Lake, 1 skin (U.S.N.M.), approaching *carissima;* Towner, 28 skins (U.S.N.M.), approaching *carissima.*

NOVA SCOTIA: Halifax, 41 alc. (U.S.N.M.); no exact locality, 1 alc. (B.M.).

OHIO: Circleville, 1 skin (U.S.N.M.).

ONTARIO: Linwood, 1 skin (A.N.S.P.); Macdiarmid, Lake Nipigon, 2 skins (Roy. Ont. Mus. Zool.); Muskoka, 1 skin (M.C.Z.); Ottawa, 2 alc. (U.S.N.M.); Waterloo County, 11 skins (F.M.).

PENNSYLVANIA: Big Tink Pond, 1 skin (A.M.N.H.); Kring's Station, Cambria County, 1 skin (A.N.S.P.); Lake Ganoga, Sullivan County, 1 skin (A.N.S.P.); Round Island, Clinton County, 2 alc. (A.N.S.P.).

PRINCE EDWARD ISLAND: 1 skin, 1 alc. (U.S.N.M.); Mount Herbert, 1 alc. (U.S.N.M.).

QUEBEC: Godbout, 7 alc. (U.S.N.M.); Lac aux Sables, 1 skin (A.N.S.P.); Rupert House, James Bay, 1 alc. (U.S.N.M.).

SOUTH CAROLINA: Beaufort, 2 alc. (U.S.N.M.).

SOUTH DAKOTA: Cedar Island, 1 alc. (U.S.N.M.).

TEXAS: Fort Hancock, 1 skin (U.S.N.M.).

VERMONT: Brandon, 5 skins (U.S.N.M.); Proctor, 2 skins (U.S.N.M.); Weathersfield, 1 skin (M.C.Z.).

VIRGINIA: Aylett, 4 alc. (U.S.N.M.); Falls Church, 4 skins, 67 alc. (U.S.N.M.), 2 skins (U.C.); Four Mile Run, 1 skin (U.S.N.M.); Middletown, 2 skins, 2 alc. (U.S.N.M.); Riverton, 1 skin (U.S.N.M.); Spring Hill, 2 skins (U.S.N.M.).

WEST VIRGINIA: Franklin, 1 skin, 1 alc. (U.S.N.M.); White Sulphur Springs, 4 skins (U.S.N.M.), 5 skins (M.C.Z.), 6 skins (F.M.).

WISCONSIN: Beaver Dam, 2 skins (F.M.); Cassville, 6 skins, 8 alc. (U.S.N.M.); Delavan, 2 skins (U.S.N.M.), 3 skins (M.C.Z.), 1 skin (U.C.); Devil's Lake, 1 skin, 5 alc. (U.S.N.M.); De Sota, 1 alc. (U.S.N.M.); Herbster, 1 skin (U.S.N.M.); Lake St. Germain, 1 skin (U.S.N.M.); Long Lake, 2 skins (U.S.N.M.); Madison, 6 alc. (U.S.N.M.); Milwaukee, 1 skin (U.S.N.M.); Potosi, 1 skin (U.S.N.M.); Racine, 1 skin (U.S.N.M.).

WYOMING: Fremont Peak, 3 skins (U.S.N.M.), approaching *carissima;* Sand Creek, Crook County, 2 skins (U.S.N.M.).

YUKON: Yukon River, Caribou Crossing, 1 skin (U.S.N.M.); Yukon River, 50 miles below Fort Selkirk, 1 skin (U.S.N.M.).

Remarks.—Among the smaller brownish bats of eastern North America *Myotis lucifugus lucifugus* may usually be at once recognized, when in fresh adult pelage, by the long glossy tips to the hairs of the back taken in connection with the presence of the dark shoulder spot and the faintly yellowish belly. Variations in the intensity of the coppery or bronzy tint are found among specimens from any locality in various parts of the eastern United States; but west of the Mississippi, or roughly, west of the ninetieth meridian, the bronzy extreme is almost wholly lacking, the more brassy or "ochraceous-tawny" prevails, and the less intensely colored individuals usually are dull whitish below lacking the buffy tone.

The typical subspecies has the widest range of any North American form of *Myotis* and it probably penetrates farther north than any other American bat. Here the limits of its distribution seem to correspond roughly with those of the coniferous forest, from southeastern Labrador westward to James Bay, and thence northwestward in the interior along the edge of the Barren Grounds nearly to the Arctic Ocean (50 miles from the mouth of the Coppermine River), finally reaching the Yukon Basin and the Pacific coast of the Alaskan Peninsula (Kodiak Island). It intergrades with the darker race *alascensis* on the coast of southern Alaska and in British Columbia. The western border of its range in Canada probably runs east of the Rocky Mountains to Saskatchewan and Manitoba, thence across the United States through the Dakotas to central Colorado. In the dry interior of the northern United States, as in Colorado, Montana, and Wyoming, it gives place gradually to the paler subspecies *carissima.* Throughout much of eastern North America *Myotis lucifugus lucifugus* seems to be the commonest member of the genus.

MYOTIS LUCIFUGUS ALASCENSIS Miller

Vespertilio gryphus lucifugus H. ALLEN, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 78, March 14, 1894 (part, specimens from Washington).—TROUESSART, Catal. Mamm. viv. foss., p. 131, 1897 (part).

Myotis lucifugus alascensis MILLER, North Amer. Fauna, No. 13, p. 63, October 16, 1897.—ELLIOT, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 402, March, 1901.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 256, December 27, 1901.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 92, 1904.—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 479, 1905.—LYON and OSGOOD, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 270, January 28, 1909.—SETON, Life Hist. Northern Anim., p. 1148, 1909.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 55, December 31, 1912.—H. W. GRINNELL, Univ. California Publ.

Zool., vol. 17, p. 267, January 31, 1918.—J. GRINNELL, Univ. California Publ. Zool., vol. 21, p. 314, January 27, 1923.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 69, April 29, 1924.

Myotis yumanensis saturatus OSGOOD, North Amer. Fauna, No. 21, p. 36, September 26, 1901 (not of Miller, 1897; see H. W. GRINNELL, Univ. Calif. Publ. Zool., vol. 17, p. 432, April 25, 1918).

Myotis pernox HOLLISTER, Smithsonian Misc. Coll., vol. 56, No. 26, p. 4, December 5, 1911 (Henry House, Alberta, Canada).—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 56, December 31, 1912.—ELLIOT, Check List Mamm. North Amer., suppl., p. 155, 1917.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 69, April 29, 1924.

Type locality.—Sitka, Alaska.

Type specimen.—Adult female, in alcohol, No. 77416, United States National Museum (Biological Survey collection), collected at Sitka, Alaska, August 5, 1895, by Clark P. Streator. Original number 4754.

Distribution.—Moist coastal region of western North America, from the archipelago of southern Alaska south through British Columbia and thence southeastward following the saturate area into northeastern Washington (Blue Mountains) and extreme western Montana, and again coastwise across western Washington and Oregon to the northwest coastal strip of California (Humboldt County).

To the north and west of this area intergradation takes place with *Myotis lucifugus lucifugus* which occurs in nearly typical form on Kodiak Island and in the interior of Alaska. In the dry lowlands of eastern Washington and Oregon, that is, to the east of the coast ranges that serve to withdraw much of the atmospheric moisture coming from the Pacific Ocean, the transition is fairly rapid to the much paler *M. lucifugus carissima.* A similar transition to *carissima* is seen from the Mount Shasta region of northern California, eastward and southward to the edge of the Great Basin.

Diagnosis.—A dark, "saturate" race; size as in typical *Myotis lucifugus.*

Description.—Similar to typical *Myotis lucifugus* but the general color and especially the under-fur is so darkened that the whole appearance is sooty with inconspicuous dark bronzy gloss on the back. The fur of the upperparts is everywhere blackish at the base becoming dark brown subterminally with a mahogany cast, nearly "light seal brown" of Ridgway (1912). The extreme tips of the long hairs are glossy, reflecting the light in such a way as to give the impression, especially when the hair is disarranged, of bronzy streaks. The shoulder spot is without these glossy tips but is not otherwise different from the rest of the body in color. Below, the tips of the hairs are darker buff than in the typical form, with a distinct brownish cast especially on throat and chest; in some Alaskan specimens almost uniform sooty brown. Individuals in imperfect pelage, in which the long glossy-tipped hairs are not wholly grown out, are a very dark sooty color, in contrast to the grayer tint of specimens of *M. lucifugus lucifugus* in corresponding condition. The ears, nose, and membranes are very dark, almost black.

Measurements.—For cranial measurements see table, page 60.

Specimens examined.—Total number 95, from the following localities:

ALASKA: Admiralty Island, Mole Harbor, 1 skin (U.C.); Baranoff Island. Red Bluff Bay, 10 skins (U.C.); Boca de Quadra, 1 skin (U.C.); Ketchikan, 1 skin, 2 alc. (U.S.N.M.); Loring, 1 skin, 3 alc. (U.S.N.M.); Revillagigedo Island, 2 skins (U.C.); Sitka, 7 alc. including the type (U.S.N.M.).

ALBERTA: Henry House, 2 skins (U.S.N.M.), not typical (type and paratype of *pernox*).

BRITISH COLUMBIA: Field, 1 skin (U.S.N.M.); Okanagan, 1 skin (M.C.Z.); Queen Charlotte Islands., 4 alc. (U.S.N.M.), Skidegate, 4 skins, 1 alc. (U.S.N.M.); Sicamous, 1 alc. (A.N.S.P.); Vernon, 1 skin (M.C.Z.).

CALIFORNIA: Castle Lake, Siskiyou County, 1 skin (U.C.), not typical; Eureka, Humboldt County, 1 skin (U.C.).

IDAHO: Felton Mills, 1 skin (Chas. R. Conner Museum).

MONTANA: Columbia, 1 alc. (U.S.N.M.); Corvallis, 4 skins (U.C.), 5 skins (U.S.N.M.) and 1 skin not typical (U.S.N.M.).

OREGON: Bend, 3 skins (U.S.N.M.), not typical; Blue River, 1 skin (U.S.N.M.), not typical; Cornucopia, 1 skin (U.S.N.M.); East Pine Creek, 1 skin (U.S.N.M.), not typical; Lapine, 1 skin (U.S.N.M.); McKenzie Bridge, 2 skins (U.S.N.M.); Mohler, Tillamook County, 1 skin (U.C.).

WASHINGTON: Boulder Lake, 1 skin (F.M.); Butte Creek, Blue Mountains, Columbia County, 1 skin (U.C.); Carson, Skamania County, 4 skins (U.S.N.M.); Chilliwack River, Whatcom County, 3 skins (U.S.N.M.); Godman Springs, 5 skins (S. H. Lyman); Hannegan Pass, Whatcom County, 1 skin (U.S.N.M.); Husum, Klickitat County, 1 skin (U.S.N.M.); Lyle, Klickitat County, 1 skin (U.S.N.M.); Mount Ranier, Pierce County, 5 skins (U.S.N.M.); Soleduc River, Olympic Mountains, 1 skin (U.S.N.M.), 1 skin (F.M.); Trout Lake, Klickitat County, 1 skin (U.S.N.M.); Wenatchee Lake, Chelan County, 2 skins (U.S.N.M.); Whatcom Pass, Whatcom County, 1 skin (U.S.N.M.).

Remarks.—There is apparently no difference in size between *Myotis lucifugus alascensis* and the typical race; the length of ear, noted in the original description as slightly greater, appears on further study to be the same in both forms. Occasional individuals representing the extreme of size do, however, occur. Thus, two specimens from Henry House, Alberta, are distinctly larger than the average; in color one is intermediate between typical *lucifugus* and *alascensis*, while the other can not be distinguished from richly colored examples of the eastern subspecies. The darker specimen served as the type of *Myotis pernox* Hollister. Until there is evidence that they represent a form with a definite range, it now seems most satisfactory to regard these specimens as large individuals of the present race, showing intergradation toward true *Myotis lucifugus.* Two specimens taken in Bitter Root Valley, western Montana (Corvallis), are similarly dark, while a third (No. 160181, U.S.N.M.), also from Corvallis, is a typical *carissima* in color. Their size is normal. Seven skins from Oregon (Bend, 3; Blue River, 1; Lapine, 1; McKenzie Bridge, 2) present some of the same peculiarities. Five of them are indistinguishable from true *Myotis lucifugus*, two (one from Lapine and one from McKenzie Bridge) are darker. None of them shows an increase in size. One skin from Donner, Calif. (No. 100377, U.S.N.M.), is like eastern *lucifugus*, while two others have the color characteristic of *M. l. carissima.* Whether the western specimens indistinguishable in color from true *Myotis lucifugus* should be regarded as indicating that the range of the typical subspecies actually extends southward along the mountains between the areas occupied by the races *carissima* and *alascensis*, or whether they are best explained as intermediates between the two western races is a question which can not now be answered. The second alternative, however, appears to be the more probable.

MYOTIS LUCIFUGUS CARISSIMA Thomas

Myotis yumanensis saturatus MERRIAM, North Amer. Fauna, No. 16, p. 89, October 28, 1899 (not of Miller, 1897).—STEPHENS, California Mammals, p. 267, 1906 (part).—J. GRINNELL, Proc. California Acad. Sci., ser. 4, vol. 3, p. 277, August 28, 1913 (part).

Myotis yumanensis REHN, Proc. Acad. Nat. Sci. Philadelphia, 1904, p. 590 (not of H. Allen, 1864).

Myotis (*Leuconoë*) *carissima* THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 13, p. 383, May, 1904.

Myotis carissima MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 56, December 31, 1912.—ELLIOT, Check-list Mamm. North Amer., suppl., p. 154, 1917.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 70, April 29, 1924.

Myotis yumanensis altipetens H. W. GRINNELL, Univ. California Publ. Zool., vol. 17, p. 9, August 23, 1916 (Merced Lake, Yosemite Park, California).

Myotis lucifugus carissima CARY, North Amer. Fauna, No. 42, p. 43, 1917 (Colorado).—BAILEY, North Amer. Fauna, No. 49 [December, 1926], p. 215, January 8, 1927 (North Dakota).

Myotis lucifugus altipetens H. W. GRINNELL, Univ. California Publ. Zool., vol. 17, p. 263, January 31, 1918.—J. GRINNELL, Univ. California Publ. Zool., vol. 21, p. 214, January 27, 1923.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 70, April 29, 1924.—GRINNELL and STORER, Anim. Life in the Yosemite, p. 55, 1924.

Myotis albicinctus G. M. ALLEN, Jour. Mamm., vol. 1, p. 2, November 28, 1919 (Mt. Whitney, California).—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 68, April 29, 1924.

Type locality.—Yellowstone Park, Wyo.

Type specimen.—Adult female, in alcohol, No. 4.4.25.1, British Museum (Natural History), collected at Yellowstone Lake, Yellowstone National Park, Wyo., September, 1903, by J. ffolliott Darling.

Distribution.—Semi-arid portions of the western United States from southern and eastern Montana and parts of Wyoming west to eastern Oregon and the Sierras of California.

Intergradation with typical *Myotis lucifugus* takes place in the Dakotas, and with *M. lucifugus alascensis* in the Sierras of northern California and in the eastern half of Oregon and Washington. In the mountains of western Montana, two specimens taken at Corvallis are dark enough to be referable to *M. l. alascensis*, yet a third is so contrastingly pale and with white-edged membranes as to be typical of *M. l. carissima.* This individual had perhaps come from a lower level or had wandered in from the south. Not infrequently specimens are found in eastern Oregon or northern California that might, with equal propriety, be referred to either race, it becoming, therefore, a matter of individual judgment which name shall be given to them. Yet the transition is rather abrupt in most places. Montana specimens tend to have a faint trace of the bronze tint characterizing the eastern *M. lucifugus lucifugus* while those from the northern Sierra Nevada of California have a golden brown cast. As pointed out by Mrs. Grinnell (1918) this bat is chiefly an inhabitant of the forested areas at the higher levels in California, and has been taken at 11,000 feet on Mount Whitney at the upper limit of trees. San Bernardino Mountains, Calif., where several specimens were taken at about 7,000 feet, represent the southern limit of its range as now known.

Diagnosis.—Color paler than in *Myotis lucifugus lucifugus*, the general hue of the upper parts golden instead of bronzy or olive, the belly cartridge buff rather than light chamois; membranes tending to be pale-edged; ears dark; foot larger than in the typical race, the ratio of its length to that of tibia about 55.7.

Description.—Entire dorsal surface a pale "cinnamon-buff," the hair of the back with long glossy tips which give a more or less golden sheen. Shoulder spot ochraceous tawny; lower surface a pale buff, very nearly the cartridge buff of Ridgeway. The hairs both above and below have dark blackish-plumbeous bases except at the posterior border of the venter where they are white throughout. Ears, feet, and proximal portion of wing membranes black contrasting with the pallid pelage; or in some specimens becoming browner. The edges of the interfemoral membrane and parts of the posterior edge of the wing membrane may be whitish, sometimes forming a distinct border.

Measurements.—The dimensions of the type are given by Thomas as: forearm 28 mm.; head and body 45; tail 36; ear 13 by 8; third metacarpal 33; first phalanx 11.5; second phalanx 10.5; third phalanx 7.2; tibia 16; foot with claws 11; calcar 16.

For other measurements, see tables, pages 58 and 60.

Specimens examined.—Total number 225, from the following localities:

CALIFORNIA: Bear Lake, San Bernardino Mountains, 1 skin (U. C.); Bluff Lake, San Bernardino Mountains, 4 skins (U. C.); Castle Lake, Siskiyou County, 1 skin (U. C.); Donner, 3 skins (U.S.N.M.), not typical; Feather River, north fork, 3 alc. (U.S.N.M.); Gilmore Lake, 1 skin (U. C.); Ice Caves, 6 miles west of Tule Lake, 2 skins (U.S.N.M.), not typical; Independence Lake, 2 skins (U. C.); Keeler, Inyo County, 7 alc. (U.S.N.M.); Lincoln Creek, Sierra County, 7,000 ft., 1 skin (U.S.N.M.); Lone Pine, Inyo County, 1 skin (U.S.N.M.); Mammoth, Mono County, 1 skin (M. C. Z.); Mount Shasta, 4 skins (U.S.N.M.), 3 skins (U. C.), approaching *alascensis;* Mount Tallac, 2 skins (U. C.), 1 skin (A. N. S. P.), 1 skin (M. C. Z.); Mount Whitney, 1 skin (M. C. Z.), type of *albicinctus;* Prattville, 1 skin (U.S.N.M.); Santa Ana River, San Bernardino Mountains, 1 skin (U. C.); Susanville, 1 skin (U.S.N.M.); Warren Peak, Warner Mountains, 3 skins (U. C.); Yosemite Park, 3 skins (U. C.), including type of *altipetens.*

COLORADO: Conejos River, 1 skin (U.S.N.M.); Meeker, 2 skins (U.S.N.M.); Steamboat Springs, 1 skin (U.S.N.M.).

IDAHO: Birch Creek, 1 alc. (U.S.N.M.).

MONTANA: Big Belt Mountains, near Fort Logan, 2 skins (U.S.N.M.); Big Timber, 7 skins (U.S.N.M.); Corvallis, 1 skin (U. C.), not typical; Crow Agency, 4 skins (U.S.N.M.); Cut Bank, 25 miles N. W. of (Teton County), 37 alc. (U.S.N.M.); Glasgow, 45 skins (U.S.N.M.), not typical.

NEVADA: Little High Rock Canyon, Washoe County, 2 skins (U. C.); Pyramid Lake, 1 alc. (U.S.N.M.); Ruby Valley, 1 skin (U.S.N.M.).

NEW MEXICO: Sierra Grande, Union County, 1 skull only (U.S.N.M.) (determination not positive).

OREGON: Baker County, 1 alc. (U.S.N.M.); Klamath Falls, 9 skins (U. C.), a little darker than typical; Malheur Lake. 1 skin (U.S.N.M.); Narrows, 1 skin (M. C. Z.); Paulina Lake, 1 skin (U.S.N.M.); Riverside, 1 skin (U.S.N.M.); Sheaville, 1 skin (U.S.N.M.); Steen Mountains, 3 skins (U.S.N.M.), nearing *lucifugus lucifugus;* Voltage, 3 skins (U.S.N.M.); Watson, 1 skin (U.S.N.M.).

UTAH: Bear River, mouth of, 2 skins (young), 18 alc. (U.S.N.M.); Bountiful, 1 alc. (U.S.N.M.); Provo City, 1 alc. (U.S.N.M.).

WASHINGTON: Stehekin, Okanogan County, 5 skins (U.S.N.M.).

WYOMING: Fremont Peak, 1 alc. (U.S.N.M.); Geyser Basin, 1 alc. (U.S.N.M.); Sand Creek, 1 skin (U.S.N.M.); Yellowstone Park, Mammouth Hot Springs, 17 skins, 2 alc. (U.S.N.M.).

Remarks.—The United States National Museum contains an excellent series of *Myotis lucifugus carissima* collected at the type locality, where it is evidently common. Three of these, an alcoholic (No. 153635) and two skins with skulls (Nos. 208562 and 209858), were sent to Mr. Oldfield Thomas, who has very kindly compared them with the type in the British Museum, and pronounces them undoubtedly the same. Since the type is in alcohol, its general dark appearance gives little clue to the natural color. Thomas says: "Color above and below (in spirit) uniform smoky blackish, the tips of the hairs indistinctly buffy or pale brown." This account applies sufficiently well to the appearance of a dull colored individual seen in alcohol, but it gives no idea of the color characteristic of the race. For this reason, Mrs. H. W. Grinnell was misled into supposing that the pale California bat was different from *Myotis carissima.* She therefore renamed it *altipetens* on the basis of a specimen from Yosemite Park, California. Specimens frequently occur with a well-marked though narrow white edge along the posterior margin of the wing membrane, and the terminal part of the interfemoral membrane may also be more or less whitish. It was an extreme example of this style that served for the type of *M. albicinctus* G. M. Allen, while the type of *altipetens* H. W. Grinnell is similarly marked. Both are unquestionably to be referred to the present subspecies.

The specimen No. 32029, from Geyser Basin, Wyoming, already mentioned (p. 8) on account of its abnormal teeth (*pm* ^{3} right absent, *pm* ^{2} and *pm* ^{3} left coalesced) is further peculiar in the general slenderness of its skull. It appears, however, to be referable to the present form.

MYOTIS LUCIFUGUS PHASMA, new subspecies

Myotis yumanensis Cary, North Amer. Fauna, No. 33, p. 207, 1911 (not of H. Allen, 1864).—Warren, Mammals of Colorado, p. 273, 1912 (part).

Type.—Adult female, skin and skull No. 148159 United States National Museum (Biological Survey collection), collected at Snake River, south of Sunny Peak, Routt County, Colorado, August 28, 1906, by Merritt Cary. Original number, 792.

Distribution.—Arid portions of the Great Basin. Limits of range not known.

Presumably this race will be found to occupy all of the more arid parts of the Great Basin, where no doubt it will prove to be of local occurrence, depending on proper conditions. The Colorado localities probably represent the extreme northeastern limits of its range in the desert valleys of western Colorado (Upper Sonoran Zone). The three secured by Cary were captured "in deserted ranch buildings after nightfall, where they were not at all common, being greatly outnumbered by *M. evotis.*" Its presence in southern Utah can not be doubted, but no specimens are at hand. Two immature bats from the Bear River in the northern part of the state, though still in dark pelage, seem better referred to *carissima.* A single specimen from Inyo County, California, though in poor pelage, is, however, apparently *phasma*, thus carrying the range across to the Californian deserts. The type-specimen of *M. albicinctus* G. M. Allen, from Mount

Whitney, California, though very pale in general coloration, is referable to *carissima*.

Diagnosis.—In general like *Myotis lucifugus carissima* but color of fur even more pallid and ears light brown instead of blackish.

Description.—Very pallid, the general effect above a uniform pale buff with a pronounced pinkish cast and a faint golden gloss; below buffy white. In detail: the fur of the body is everywhere dark plumbeous at the base, that of the back with a narrow ring of "ochraceous-buff" and a "light-buff" glossy tip. The ochraceous-buff ring showing through the paler glossy tips produces the pinkish tint. The edges of the ears and their bases exteriorly are clothed with short hair, pale "ochraceous-buff" throughout. Short stiff hairs about the upper lip between the eye and the muzzle are dusky brown. The usual darker shoulder-spot is hardly apparent, but is marked by an area of pale cinnamon. Ears and membranes pale brownish (not blackish as in *M. lucifugus carissima*), the edge of the interfemoral membrane, especially near the tip of the tail, and the posterior rim of the wing membranes whitish.

Measurements.—For measurements see tables, pages 58 and 61.

Specimens examined.—In all 4, from the following localities:

CALIFORNIA: Argus Mountains, Inyo County, 1 skin (F.M.).

COLORADO: Lily, Routt County, 1 skin (U.S.N.M.); Snake River, Routt County, 2 skins (U.S.N.M.).

Remarks.—The desert race *phasma* is the opposite extreme from the saturate *Myotis lucifugus alascensis* of the moist Pacific coast. Between the two is interposed the form *carissima* which, although intermediate, is so constant in color over a wide area as to constitute a subspecies with a definite geographic range. So closely does *Myotis lucifugus phasma* parallel typical *M. yumanensis* in color that Cary (1911) very naturally considered his Colorado specimens as belonging to that species. They are readily separated however, by the longer glossy-tipped fur above, the longer forearm and wing-bones, and by the larger skull with its less elevated brain case, characters diagnostic of *Myotis lucifugus*.

MYOTIS LUCIFUGUS FORTIDENS, new subspecies

Type.—Adult female (in alcohol) No. 88.8.8.18, British Museum (Natural History). Collected at Teapa, Tabasco, Mexico, by H. H. Smith, January 5, 1888. Presented by Messrs. Salvin and Godman.

Distribution.—From southern Mexico north to extreme western Texas.

At present only two specimens are known which can be referred to this race. The exact limits of the range are therefore problematical.

Diagnosis.—Size and color about as in *Myotis lucifugus lucifugus;* skull with sagittal crest probably more frequently developed than in the other races (present in both of the known specimens); molariform teeth, both above and below, enlarged, so that the distance between the canine and *pm* ^{4} is reduced, and a noticeable crowding of the two small premolars takes place.

Color.—The type, after long immersion in alcohol shows such obvious indications of fading that its color can not be regarded as normal. It resembles that of similarly faded old specimens of *Myotis lucifugus lucifugus.* The second specimen, a skin from Fort Hancock, Tex., is not distinguishable from the less glossy individuals of the northeastern race.

Skull.—The skull does not differ from that of *Myotis lucifugus lucifugus* except that the presence of the sagittal crest in the two known specimens is an indication that this ridge is more usually well developed than in the northern races.

Teeth.—The teeth resemble those of the typical race in form, but the size of the molars and large premolar is obviously increased. In the type specimen the crown of *m* ^{2} measures 1.40 by 1.85 mm.; in the Fort Hancock specimen it is slightly larger, 1.45 by 1.85 mm. The corresponding measurements in *Myotis lucifugus lucifugus* and *M. l. carissima* are usually 1.20 to 1.35 by 1.50 to 1.70. While the increase in size of the individual cheek teeth does not produce a lengthening of the entire tooth row as measured from front of canine to back of last molar (see tables of measurements), it increases the distance from front of *pm* ^{4} to back of *m* ^{3} as compared with the other races of *M. lucifugus*, with the result that the space occupied by the two small premolars between the canine and the large premolar is shortened. In this reduced space only one small tooth is visible when the maxillary series is viewed from the side. This crowding is so great in the type specimen that the posterior small tooth has been eliminated.

Measurements.—For measurements see tables, pages 58 and 61.

Specimens examined.—Total number 2, from the following localities:

TEXAS: Fort Hancock, El Paso County, 1 skin (U.S.N.M.).
TABASCO: Teapa, 1 alc. (B.M.).

Remarks.—Although the material is unsatisfactory, the two specimens indicate rather clearly the existence of a Mexican race of *Myotis lucifugus.* This form will probably be found to occur along the border of the United States south of the region occupied by the light-colored, small-toothed subspecies *carissima* and *phasma.*

The Fort Hancock specimen agrees perfectly with the type in the large size of the molariform teeth as compared with those of the other races of *M. lucifugus.* Its upper premolars are abnormal in a way that we have never seen in any other bat. The large tooth is completely separated from the first molar by a noticeable space. Its main axis is tilted forward so that the line of the posterior cutting edge would, if continued forward, strike the shaft of the canine near the tip. The two small premolars are present, but the second is unusually minute and is crowded beneath the inner anterior border of the large premolar. To the anterior border of the large premolar is soldered a small tooth essentially like a normal small premolar and not in the least resembling a milk tooth, its tip level with the tip of the main cusp of the large premolar and functioning with it as shown by the worn areas on the two summits. These abnormal conditions are fully developed and symmetrical on the two sides.

External measurements of Myotis lucifugus

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis lucifugus lucifugus													
Alaska:													
Iliamna Lake	14089	♀	49.5	39.0	17.0	9.5	38.0	8.0	34.5	33.0	14.5	13.0	9.5
Kodiak Island	62751	♀	46.5	37.5	16.0	9.0	37.5	7.5	33.5	31.0	14.0	11.0	8.5
Do	62752	♀	49.5	34.5	16.5	9.5	38.0	7.0	34.5	33.0	15.0	12.5	9.0
Do	62753	♀	44.5	34.0	16.0	9.0	38.0	7.0	34.0	33.0	14.5	12.5	9.5
Quebec:													
Godbout	187280	♂	50.0	41.5	17.0	9.5	39.0	8.0	35.5	34.5	15.5	12.0	9.0
Do	187281	♀	49.0	36.0	16.5	9.0	37.5	7.5	34.0	32.5	14.0	12.5	9.0
Do	187282	♀	48.0	37.0	17.0	9.0	38.0	7.0	35.5	34.0	14.0	12.0	10.0
Do	187283	♀	51.0	35.0	17.0	8.0	37.0	6.5	34.0	32.5	12.5	10.5	9.5
Do	187284	♂	46.0	35.0	16.5	9.0	37.5	7.0	34.5	33.5	13.5	10.0	8.5
Do	187285	♀	44.0	38.0	17.0	9.0	37.5	7.0	35.0	32.5	13.0	11.0	8.5
Do	187286	♀	49.5	41.0	17.5	9.0	38.5	7.5	35.0	33.0	15.0	13.0	9.0
James Bay	5376	♂	48.0	35.0	17.0	9.0	37.0	6.0	34.0	31.5	13.0	10.0	8.5
Ontario:													
Ottawa	187278	♂	47.0	38.0	18.0	9.0	38.0	6.5	36.0	34.0	14.0	12.0	9.0
Do	187279	♂	48.5	38.0	18.0	9.5	39.5	7.0	36.0	34.5	15.0	12.0	9.5
Nova Scotia:													
Halifax	154505	♀	48.0	36.0	16.5	9.0	38.5	7.0	34.5	32.5	14.5	11.0	9.0
Do	154506	♀	46.0	39.0	17.0	9.0	39.0	7.0	35.0	34.0	14.5	11.0	9.0
Do	154507	♀	50.5	34.0	17.0	9.0	39.5	7.0	35.0	33.0	12.5	11.0	8.0
Do	154508	♀	47.0	36.0	17.0	8.0	38.0	7.0	35.0	33.0	12.5	11.5	8.5
Do	154515	♀	46.0	32.5	17.0	8.5	38.5	7.0	36.0	34.5	14.0	13.0	8.5
Do	154521	♀	48.5	39.0	17.5	8.5	39.0	6.5	35.5	33.0	12.5	11.0	9.0
Do	154522	♀	47.0	36.5	17.0	8.5	39.5	6.0	35.5	35.0	13.5	10.0	8.0
Do	154523	♀	50.5	40.5	17.0	9.0	40.0	8.0	36.0	34.0	14.0	12.5	8.0
Do	154524	♀	45.5	37.5	16.5	9.0	38.5	6.5	36.0	34.5	14.0	11.0	8.0
Do	154525	♀	47.5	40.0	17.5	9.0	37.5	6.5	34.5	33.0	13.0	12.5	9.0
Prince Edward Island	243653	♀	46.0	30.0	16.5	9.0	36.5	6.5	34.5	33.0	14.0	12.0	9.5
New York:													
Howe's Cave	71927	♂	46.5	37.0	16.5	9.0	36.5	7.5	34.0	32.5	14.0	13.0	9.0
Do	71928	♂	49.0	30.5	16.5	9.0	38.0	7.5	35.0	33.0	12.5	11.0	8.0
Do	71929	♂	48.5	31.5	17.0	9.0	38.0	8.0	35.0	33.0	14.0	13.0	9.0
Do	71930	♂	49.0	32.0	17.5	9.0	39.0	7.0	35.0	33.5	13.5	13.5	9.5
Do	71933	♂	47.5	32.5	16.5	9.0	38.0	7.0	35.0	33.0	14.0	11.0	8.5
Do	71935	♂	51.0	30.0	16.0	9.0	37.5	6.0	34.0	32.5	11.0	11.5	9.0
Do	71936	♂	45.0	34.0	17.0	9.0	38.0	7.0	35.0	34.0	11.0	10.0	9.0
Do	71937	♂	49.0	37.5	17.0	9.0	39.0	7.0	35.5	33.0	13.0	11.5	9.0
Do	71938	♂	49.0	30.5	17.0	8.5	37.0	7.0	34.0	33.0	12.0	9.0	9.0
Do	71939	♂	45.0	39.5	17.0	9.5	38.5	6.5	34.5	33.5	13.0	11.0	8.0
Virginia:													
Falls Church	143916	♂	42.0	34.0	17.0	9.0	36.0	8.0	33.0	31.0	14.0	11.0	8.0
Do	143920	♀	42.5	34.0	15.5	8.5	36.5	6.5	34.0	31.0	14.0	12.0	8.0
Do	143921	♀	41.5	33.0	17.0	9.0	39.5	7.5	34.0	32.0	13.0	10.5	9.0
Do	143922	♀	48.0	35.0	16.5	9.0	38.0	7.0	34.5	32.5	14.0	11.5	9.0
Do	143925	♀	49.5	30.5	17.0	9.5	39.0	7.0	38.5	34.5	14.5	12.0	9.5
Do	143926	♂	44.0	33.0	16.0	9.0	36.0	6.0	32.0	30.0	13.0	11.0	9.0
Do	143927	♂	44.0	30.5	17.0	9.5	37.0	6.5	34.5	33.0	13.0	11.5	8.5
Do	172094	♂	46.0	33.5	16.5	10.0	38.0	8.0	34.0	34.0	13.5	13.0	9.0
Do	172096	♀	43.5	37.0	18.0	9.0	38.0	7.0	34.5	33.5	14.0	13.0	9.0
Do	172097	♀	41.0	36.0	15.5	9.0	38.0	7.5	35.0	33.0	14.5	11.5	9.0
Do	172099	♀	44.5	33.0	15.5	8.5	36.5	7.0	33.0	31.5	14.0	11.5	8.5

External measurements of Myotis lucifugus—Continued

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis lucifugus lucifugus—Con.													
Illinois:													
Warsaw	22276	♂	44.0	37.0	17.0	9.0	37.0	7.0	34.0	32.5	14.5	12.0	9.0
Do	59356	♀	44.0	38.0	16.5	8.5	38.0	7.0	35.0	32.5	15.5	12.5	9.0
Do	59357	♀	50.0	37.0	18.0	10.0	39.0	7.0	35.0	33.0	13.0	11.0	9.0
Do	59359	♀	50.0	37.0	17.0	9.0	40.0	8.0	35.5	34.0	13.0	12.0	9.0
Do	59363	♀	48.0	35.0	17.5	10.0	37.0	7.0	33.5	32.0	13.0	12.0	8.5
Do	59365	♀	50.5	38.0	16.5	8.5	38.0	6.5	36.0	34.0	14.5	11.5	9.0
Do	59368	♀	47.0	36.0	17.0	9.5	38.5	7.0	35.5	33.0	13.5	12.5	10.0
Do	59372	♀	51.5	36.5	16.5	10.0	39.0	8.0	35.0	32.0	15.0	13.0	9.0
Do	59373	♀	44.0	39.0	17.5	10.0	40.0	7.5	36.0	34.0	14.0	12.0	9.0
Do	59383	♀	51.0	37.0	18.0	10.0	39.5	7.0	35.5	33.5	14.0	11.5	9.0
Do	59406	♀	46.5	36.5	17.0	8.5	37.0	7.5	34.0	32.5	13.5	12.0	9.0
Do	60559	♂	45.0	31.5	17.0	9.0	37.0	7.0	34.0	32.0	13.0	11.5	8.0
Do	60560	♂	49.5	29.0	16.0	9.0	36.5	7.5	34.0	32.0	14.5	12.0	9.0
Do	60561	♂	51.5	35.0	16.5	10.0	38.0	7.0	35.0	33.0	15.0	11.5	9.5
Arkansas: Fort Smith	[1] 5342	♀	46.0	39.0	16.2	9.6	39.0	7.2	34.2	33.6	13.6	10.4	8.0
Wisconsin:													
Madison	204025	♀	51.5	35.5	17.0	9.0	33.5	7.0	36.0	34.0	13.0	12.0	9.0
Do	204026	♀	50.0	36.0	17.5	9.0	39.0	7.0	35.0	32.5	14.0	11.0	9.0
Do	204027	♀	51.0	38.0	17.0	8.5	38.0	7.0	37.0	35.5	14.0	11.5	9.0
Do	206503	♀	51.5	32.5	18.0	10.0	41.0	7.5	36.5	34.5	13.0	11.5	9.0
Do	206504	♀	50.5	36.5	17.5	9.0	39.0	7.5	35.0	32.5	14.0	12.0	8.5
Cassville	179182	♀	48.5	35.0	16.5	9.5	37.0	8.0	33.5	32.0	13.5	12.0	9.5
Do	179183	♀	50.0	33.0	16.5	9.0	39.0	7.0	36.5	33.0	12.0	13.0	10.0
Do	179184	♀	49.0	35.5	17.0	9.0	39.0	8.0	36.0	33.5	12.0	11.5	8.5
Do	179185	♀	48.0	35.0	17.0	9.5	38.5	7.0	34.0	33.0	13.0	10.5	8.5
Do	179188	♀	47.5	35.0	18.0	9.0	36.5	6.5	34.0	31.5	12.0	10.5	8.0
Devil's Lake	229220	♂	46.5	29.5	15.0	10.0	36.0	7.0	34.0	31.0	14.0	10.5	9.0
Do	229222	♂	46.0	38.5	17.5	10.5	39.0	7.0	36.0	34.0	14.0	13.0	9.0
Do	229224	♂	46.0	29.5	16.0	9.5	36.0	8.5	34.0	32.5	13.0	13.0	8.0
Iowa:													
McGregor	232724	♀	49.0	32.5	16.5	8.0	38.0	7.0	35.0	33.0	13.0	12.0	9.0
Do	232726	♀	52.0	35.0	15.5	9.0	36.5	7.5	33.5	31.0	13.0	12.0	10.0
Do	232727	♀	50.0	36.0	16.0	8.5	37.0	6.5	34.5	32.0	12.0	11.0	8.5
Do	232728	♀	46.0	35.0	16.0	8.0	38.5	7.0	35.5	33.5	13.0	12.0	8.0
Missouri:													
Montgomery City	166796	♂	48.0	31.0	14.5	8.0	34.5	6.5	31.5	30.5	14.0	11.5	9.0
Do	203957	♂	46.0	36.0	16.5	8.0	38.5	7.5	36.0	32.5	14.0	11.5	8.5
North Carolina: Cherokee	23276	♀	45.0	37.5	16.0	8.5	37.0	7.0	34.5	32.0	13.5	11.5	10.0
South Carolina: Beaufort	7197	♀	44.0	37.0	15.5	8.5	38.5	7.0	33.0	32.0	13.0	11.0	9.5
Georgia: Young Harris	159437	♀	39.5	34.0	14.5	8.0	36.5	6.5	33.5	32.5	13.5	11.0	9.5
Myotis lucifugus alascensis													
Alaska:													
Sitka	77413	♀	47.5	33.5	15.5	9.0	38.0	5.5	34.0	31.5	13.5	11.5	9.0
Do	77414	♀	45.5	33.0	15.5	8.5	36.0	6.5	32.5	30.5	13.5	11.5	10.0
Do	77415	♀	46.0	34.0	15.5	10.0	36.5	6.5	34.5	32.0	14.5	12.5	9.0
Do	[2] 77416	♀	50.0	38.8	16.6	9.4	38.2	7.0	33.6	31.8	14.2	11.0	9.0
Do	77417	♀	48.0	38.5	17.0	9.0	38.0	7.0	33.0	31.0	14.5	13.0	9.0
Loring	76499	♀	44.5	29.0	16.0	7.5	36.0	7.0	34.0	31.5	13.0	12.0	7.5
Ketchikan	154980	♂	46.0	33.0	17.5	9.0	36.5	6.5	33.5	31.5	13.5	12.0	9.0
Do	154981	♀	41.0	34.0	16.5	9.0	35.5	7.0	33.0	31.0	12.5	11.0	9.0
British Columbia:													
Queen Charlotte Islands	134613	♀	47.0	35.0	17.0	8.5	37.5	7.0	34.0	31.5	14.5	12.0	9.0
Do	35603	♀	42.0	35.0	17.0	9.0	38.0	7.0	34.5	32.0	13.5	10.5	9.5
Do	72220	♂	43.5	37.5	15.5	8.5	37.0	6.5	33.0	30.5	13.0	10.5	8.5
Do	72921	♀	49.0	38.0	17.0	9.0	38.0	7.5	35.0	33.0	14.0	10.5	9.0
Alberta:													
Henry House	[3] 174134	♂	"53"	"39"	18	9.2	39.0	7.2	34.4	32.2	----	----	----
Do	174135	♂	"54"	"44"	19	10.0	40.2	7.0	37.0	34.8	----	----	----

[1] Type of *Vespertilio affinis* H. Allen.

[2] Type.

[3] Type of *Myotis pernox* Hollister.

External measurements of Myotis lucifugus—Continued

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis lucifugus carissima													
Montana:													
Teton County	197034	♀	48.5	37.5	16.5	8.5	37.0	7.5	34.0	33.5	15.0	13.5	10.5
Do	197009	♀	50.0	42.0	16.0	9.0	37.0	7.5	33.5	32.0	14.5	13.0	9.0
Do	197001	♀	49.0	38.5	16.0	9.0	36.0	7.5	34.0	32.0	15.0	13.5	9.0
Do	197002	♀	49.0	37.0	17.0	9.5	37.5	7.5	34.0	31.5	15.0	13.0	10.0
Do	197004	♀	49.5	37.5	16.5	8.5	39.5	7.0	35.0	34.0	14.5	13.0	10.5
Do	197007	♀	51.0	36.0	15.0	9.0	37.0	7.0	34.5	32.5	13.0	12.5	9.0
Do	197008	♀	49.5	38.5	16.0	9.0	38.0	6.5	35.5	34.0	14.5	13.5	9.5
Do	197011	♀	52.5	39.0	16.5	9.5	38.5	7.5	34.5	33.5	13.5	10.5	9.0
Do	197012	♀	48.5	37.0	15.5	8.5	36.0	7.5	32.5	31.5	14.0	12.5	9.0
Do	197019	♀	49.5	36.0	16.0	8.5	36.5	6.0	33.5	32.0	13.0	11.0	9.5
Wyoming:													
Fremont	203956	♀	46.4	37.4	17.6	9.0	38.2	6.8	34.0	-----	14.0	12.2	8.4
Geyser Basin	13232	♀	49.0	40.2	16.4	10.2	38.2	7.2	35.0	33.2	15.0	14.4	8.2
Mammoth Hot Springs.	209858	♀	47.2	39.0	17.4	9.0	38.4	6.6	34.0	34.0	14.2	12.6	8.6
	209859	♀	48.0	42.0	18.2	9.2	40.0	8.0	36.2	34.2	15.4	12.2	9.0
Utah:													
Mammoth Bear River	206416	♀	47.0	31.0	16.0	9.0	37.5	7.0	35.0	32.5	14.0	12.0	9.0
Do	206417	♀	49.0	38.0	18.5	9.0	39.0	8.0	36.0	34.5	14.5	12.5	9.0
Do	206418	♀	45.0	36.0	17.0	8.5	38.0	6.0	36.5	34.0	14.5	12.5	10.0
Do	206419	♀	48.5	34.5	17.0	8.0	38.5	7.0	35.0	33.0	13.5	11.5	10.0
Do	206421	♀	47.0	33.0	16.5	8.5	38.0	7.5	36.0	32.5	12.0	11.0	8.5
Do	206422	♀	50.0	40.0	19.0	8.5	39.0	7.0	38.0	35.0	12.0	10.0	10.0
Do	206423	♀	44.0	39.0	17.5	8.5	38.5	6.5	34.5	33.0	13.5	12.0	9.9
Oregon: Baker County	154273	♀	43.0	38.0	18.0	8.5	37.5	7.0	34.0	32.0	13.5	10.0	9.5
California:													
North Fork Feather River	108250	♀	42.5	36.5	15.0	9.0	38.0	7.0	34.0	33.0	13.0	10.5	9.9
Do	108251	♂	45.0	33.5	16.5	8.5	37.0	7.0	34.0	32.5	12.5	11.5	9.9
Do	125793	♂	43.5	35.0	17.5	9.0	37.5	6.5	36.0	33.5	13.5	11.5	8.5
Keeler	29836	♂	46.5	31.5	15.5	9.5	36.5	6.5	33.5	31.0	13.5	11.0	8.5
Do	29837	♀	45.5	33.0	18.0	7.5	38.5	6.0	36.5	35.0	14.0	12.0	10.0
Do	29838	♂	45.0	33.5	17.0	8.5	36.5	6.0	35.0	33.0	12.5	11.0	9.5
Do	29839	♀	41.5	32.5	17.5	7.5	38.0	6.5	35.0	33.5	13.0	12.0	9.0
Mount Whitney	[4] 11747 M. C. Z.	♂	43.5	42.5	16.0	9.0	37.0	----	-----	-----	15.0	-----	----
Myotis lucifugus phasma													
Colorado:													
Snake River	148158	♀	"49"	"36"	16.0	"10"	36.2	6.2	33.4	31.0	-----	-----	----
Do	[5] 148159	♀	"50"	"38"	17.2	"10"	38.6	6.6	34.2	33.0	-----	-----	----
Lily	148167	♂	"49"	"38"	17.0	"9"	37.2	6.8	34.2	32.6			
Myotis lucifugus fortidens													
Texas: Fort Hancock	21083 36121	♀	53.6	34.2	14.6	7.2	37.4	6.0	33.6	32.6	-----	-----	----
Mexico: Tabasco	[5] 88.8.8.18 B. M.	♀	46.0	39.0	15.6	8.0	38.6	6.2	34.8	33.0	13.6	12.0	7.8

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[4] Type of *Myotis albicinctus* G. M. Allen.

[1] Type.

Cranial measurements of Myotis lucifugus

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis lucifugus lucifugus													
Yukon:													
Below Fort Selkirk	99364 U.S.N.M.	♂	15.0	14.0	-----	4.1	7.5	5.4	10.7	5.4	6.1	5.8	0
Caribou Crossing	99363	♀	15.1	14.0	-----	4.0	7.5	5.1	10.7	5.5	5.8	5.7	0
Alaska:													
Kodiak Island	91563	♂	14.2	13.8	-----	4.0	7.1	5.3	10.5	5.2	5.8	5.7	1
Do	91565	♀	14.8	13.8	-----	4.0	7.2	5.2	10.4	5.4	5.8	5.7	1
Do	91564	♀	14.9	14.0	-----	4.0	7.3	5.3	10.8	5.2	5.9	5.6	1
Do	62752	♀	15.0	14.1	9.2	4.1	7.3	5.1	10.8	5.3	6.0	5.7	0
Do	62753	♀	14.8	14.1	-----	4.0	7.3	5.1	10.6	5.4	6.0	5.7	0
Ontario:													
Waterloo County	7309 F.M.	♂	15.0	14.3	-----	4.2	7.4	5.0	10.6	5.5	5.8	5.7	0
Do	8600	♀	15.0	14.2	-----	4.0	7.2	5.2	10.5	5.4	5.8	5.7	0
Do	8601	♀	14.8	14.0	-----	4.0	7.3	5.1	10.6	5.4	5.9	5.7	0
Manitoba: Hartney	32969 U.C.	----	15.2	14.4	-----	4.0	7.7	5.1	10.9	5.5	6.0	5.8	0
Quebec: James Bay	38595 U.S.N.M.	♂	14.5	13.6	9.1	4.0	7.6	5.1	10.2	5.2	5.8	5.5	0
Nova Scotia:													
Halifax	154505	♀	15.0	14.0	9.0	4.1	7.3	5.2	10.1	5.2	5.8	5.7	0
Do	154509	♀	14.8	14.0	9.0	4.2	7.2	5.1	10.5	5.3	5.8	5.7	0
Do	154512	♀	14.5	13.9	8.7	4.2	7.2	5.0	10.4	5.3	5.4	5.8	1
Do	154516	♀	14.5	13.8	8.1	4.0	7.5	5.1	10.5	5.2	5.8	5.6	1
Do	154519	♀	14.8	13.8	8.9	4.1	7.5	5.0	10.3	5.2	5.6	5.6	2
New York:													
Locust Grove	187357	♂	14.9	14.4	-----	4.4	7.4	5.3	10.9	5.5	5.8	5.7	1
Catskill Mountains	83000	♂	14.6	13.8	-----	4.0	7.3	5.3	10.5	5.4	5.6	5.6	3
Howe's Cave	187308	♂	14.8	14.1	9.2	4.2	7.4	5.3	10.5	5.2	5.6	5.6	3
Do	187333	♀	15.0	14.0	-----	4.2	7.5	5.3	10.3	5.2	5.7	5.6	0
Minnesota:													
Elk River	187387	♂	14.8	14.1	-----	4.1	7.4	5.0	10.5	5.2	5.8	5.7	0
Do	187389	♀	15.0	14.0	9.2	4.0	7.6	5.1	10.6	5.3	5.7	5.8	0
Do	187391	♂	15.0	14.0	9.5	4.2	7.6	5.3	10.6	5.3	5.9	5.8	0
Do	187392	♂	14.6	14.1	9.1	4.2	7.3	5.0	10.6	5.2	5.6	5.7	0
Do	236137	♀	15.0	14.4	9.0	4.2	7.4	5.0	10.7	5.3	5.8	5.6	0
Indiana:													
Mitchell	153629	♂	14.9	14.0	9.4	4.2	7.4	5.1	10.6	5.2	5.8	5.7	0
Do	153622	♂	14.6	13.8	-----	4.0	7.5	5.1	10.3	5.1	5.7	5.6	3
Do	153628	♂	14.9	14.2	-----	4.0	7.4	5.1	11.0	5.2	5.7	5.7	1
Do	153620	♀	15.0	14.0	-----	4.0	7.5	5.2	10.5	5.4	5.6	5.7	0
Do	153621	♀	15.0	14.1	-----	4.0	7.6	5.2	10.6	5.4	5.8	5.8	1
Do	153624	♀	15.0	14.7	-----	4.1	7.3	5.2	10.8	5.6	5.7	6.0	0
Do	153625	♀	14.7	14.0	9.1	4.0	7.2	5.2	10.8	5.3	5.7	5.7	1
Do	153626	♀	15.0	13.8	9.1	4.2	7.8	5.2	10.7	5.5	5.9	5.9	1
Do	153627	♀	15.0	14.0	9.4	4.0	7.2	5.5	11.0	5.5	6.0	5.8	1
Do	153628	♂	14.9	14.2	-----	4.0	7.4	5.1	11.0	5.2	5.7	5.7	1
Bloomington	153633	♀	15.0	14.2	9.2	4.0	7.5	5.0	10.7	5.2	5.6	5.6	2
Do	153632	♀	14.8	14.0	9.1	4.1	7.3	5.2	10.6	5.3	5.7	5.7	0
West Virginia:													
White Sulphur Springs	83917	♀	14.5	13.8	8.8	4.0	7.2	5.0	10.6	5.0	5.5	5.4	1
Do	83918	♀	14.8	13.9	9.1	4.0	7.5	5.0	10.6	5.3	5.6	5.6	1
Do	83920	♀	14.2	13.5	-----	4.0	7.2	4.9	10.0	5.1	5.7	5.5	0
Do	5612 F.M.	♀	14.5	13.6	8.9	4.0	7.1	4.9	10.6	5.3	5.4	5.7	1
Do	5613 F.M.	♀	14.2	13.3	8.4	4.0	7.3	4.9	10.0	5.0	5.5	5.4	0
Do	5614	♀	14.6	13.3	-----	4.0	7.5	5.0	10.5	5.2	5.5	5.5	1
Do	5615	♀	14.6	13.8	-----	4.0	7.4	5.0	10.8	5.2	5.4	5.5	1
Do	5616	♀	14.4	13.3	-----	4.1	7.4	5.0	10.4	5.2	5.7	5.5	1
Do	5617	♀	14.7	13.7	-----	4.0	7.4	5.1	10.5	5.2	5.8	5.5	2
Virginia:													
Middleton	243086 U.S.N.M.	♀	14.6	13.8	-----	4.1	7.5	5.3	10.8	5.3	5.9	5.7	3
Do	243087	♀	14.1	13.4	-----	4.1	7.3	5.0	10.2	5.0	5.5	5.4	3
Riverton	87447	♀	14.6	13.6	9.2	4.2	7.5	5.2	10.3	5.2	5.8	5.7	0
Georgia: Young Harris	159411 U.S.N.M.	♀	14.4	13.5	8.7	4.0	7.2	4.9	10.2	5.1	5.7	5.7	0
North Dakota:													
Towner	207725 U.S.N.M.	♂	14.8	13.9	-----	4.1	7.4	5.0	10.0	5.5	5.7	5.6	0
Do	207740	♂	14.7	14.0	8.8	4.1	7.3	5.1	10.8	5.3	5.8	5.7	0
Do	207739	♂	14.7	13.8	-----	4.0	7.5	5.1	10.4	5.3	5.7	5.7	0
Do	207736	♂	14.7	14.0	-----	4.0	7.4	5.1	10.6	5.4	5.7	5.6	0
Do	207726	♀	14.8	13.8	9.0	4.0	7.3	5.1	10.5	5.4	5.8	5.6	0
Do	207729	♀	14.9	13.8	9.3	4.0	7.5	5.2	10.7	5.3	6.0	5.6	0
Do	207730	♀	15.0	14.5	9.1	4.0	7.5	5.1	11.0	5.6	5.8	5.8	0
Do	207733	♀	14.9	14.0	9.0	4.0	7.5	5.2	10.6	5.6	5.9	5.8	0
Do	207718	♀	15.0	14.2	9.5	4.2	7.7	5.2	10.7	5.5	6.0	5.7	1

Cranial measurements of Myotis lucifugus—Continued

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis lucifugus alascensis													
Alaska:													
Admiralty Island	184 U.C.	♀	15.1	14.1	9.1	3.9	7.3	5.1	11.0	5.5	6.0	5.9	0
Baranoff Island	268	♂	14.4	13.6	-----	3.9	7.0	5.1	10.4	5.4	5.7	5.7	0
Do	270	♂	14.8	14.0	9.0	4.0	7.5	5.0	10.5	5.4	5.8	5.6	1
Do	271	♂	15.1	14.2	-----	4.0	7.5	5.3	10.7	5.3	6.0	5.7	0
Do	277	♂	14.8	14.1	-----	4.0	7.4	5.0	10.9	5.5	6.1	5.8	0
Do	278	♂	14.7	13.8	9.1	3.7	7.2	5.0	10.6	5.3	5.7	5.5	0
Do	272	♀	14.6	13.4	8.9	4.0	7.3	5.1	10.3	5.2	5.6	5.5	0
Do	273	♀	15.0	13.8	8.8	4.0	7.3	5.1	10.7	5.2	5.4	5.6	1
Do	274	♀	14.5	13.9	9.1	3.9	7.2	5.1	10.7	5.3	5.8	5.8	0
Ketchikan	154980 U.S.N.M.	♂	14.5	13.8	8.8	4.0	7.5	4.8	10.5	5.3	5.5	5.7	0
Loring	74947	♀	14.8	14.1	-----	4.0	7.4	5.3	10.9	5.4	5.8	5.8	0
Do	76499	♀	14.6	13.5	9.0	4.0	7.2	5.2	10.5	5.3	5.8	5.7	0
Sitka	77411	♀	14.4	13.5	-----	4.0	7.3	5.2	10.4	5.2	5.8	5.5	0
Do	77414	♀	14.0	13.6	9.0	3.9	7.0	5.1	10.5	5.3	5.6	5.7	0
Do	77415	♀	14.2	13.5	9.0	4.0	7.3	5.1	10.3	5.0	5.8	5.5	0
Do	[1] 77416	♀	14.8	14.2	9.0	4.1	7.5	5.2	10.4	5.3	5.6	5.8	0
Do	77417	♀	14.3	13.4	8.8	4.0	7.3	5.0	10.3	5.2	6.0	5.4	0
British Columbia:													
Field	202906	----	14.4	13.5	8.2	4.0	7.0	4.8	-----	5.3	5.8	5.6	0
Queen Charlotte Islands	100675	♂	14.6	13.6	9.0	4.0	7.4	5.2	10.2	5.4	5.8	5.6	0
Do	100676	♂	14.6	13.8	9.0	4.2	7.4	5.0	10.0	5.4	5.8	5.6	0
Do	100677	♂	15.0	14.1	9.0	4.0	7.2	5.1	10.8	5.5	5.7	5.8	0
Do	100678	♂	14.9	14.1	-----	4.1	7.4	5.2	11.0	5.6	5.9	6.0	1
Alberta:													
Henry House	[2]174134	♂	15.2	14.6	9.5	4.2	7.7	5.2	11.0	5.5	6.0	6.0	1
Do	174135	♂	15.8	15.0	9.8	4.2	7.7	5.3	11.3	5.8	6.1	6.1	0
Washington:													
Chilliwack River	234919	♂	14.1	13.2	-----	4.0	7.1	-----	10.2	5.4	5.8	5.5	1
Carson	230153	♂	14.4	13.8	-----	3.8	7.4	5.0	10.2	5.4	5.8	5.8	0
Husum	230159	♀	14.2	13.6	8.8	3.8	7.4	5.2	10.0	5.2	5.8	5.8	0
Mt. Rainier	233039	♂	14.4	13.8	8.9	3.9	7.2	5.0	10.2	5.2	5.8	5.6	2
Do	233041	♂	14.0	13.5	9.0	3.9	7.2	5.1	10.4	5.3	5.4	5.7	1
California: Eureka	11843 U.C.	♂	15.0	14.0	9.0	3.8	7.1	5.1	10.9	5.3	5.8	5.8	0
Montana:													
Corvallis	160188 U.S.N.M.	♂	14.6	13.8	9.0	4.0	7.4	5.0	10.2	5.4	6.0	6.2	0
Do	160179	♀	15.2	14.0	9.0	4.0	7.6	5.2	10.4	5.4	6.0	6.0	0
Do	160180	♀	15.0	14.0	9.0	3.8	7.4	5.2	10.2	5.4	6.0	5.8	0
Myotis lucifugus carissima													
Montana:													
Glasgow	232185	♀	15.0	14.0	9.2	3.8	7.6	5.4	10.8	5.4	6.0	6.0	0
Do	232186	♀	14.0	13.6	9.0	4.2	7.6	5.0	10.0	5.2	6.0	5.4	0
Do	232187	♀	14.8	13.6	9.4	4.0	7.6	5.2	-----	5.2	6.0	-----	0
Do	232193	♀	15.2	14.4	9.0	4.0	7.4	5.0	10.8	5.6	6.0	6.0	0
Do	232198	♀	15.4	14.6	-----	4.0	7.6	5.2	11.0	5.8	6.2	6.2	0
Do	232200	♀	15.0	14.6	9.6	4.0	7.6	5.0	10.6	5.2	6.0	6.0	1
Do	232201	♀	15.0	13.8	9.0	4.0	7.8	5.2	10.4	5.4	6.0	5.8	0
Do	232205	♀	15.4	14.0	9.4	4.0	7.6	-----	11.0	5.8	6.0	6.0	0
Do	232206	♀	15.8	15.0	9.6	4.2	7.6	5.2	11.0	5.8	6.2	6.0	0
Do	232213	♀	14.2	13.6	9.0	4.0	7.4	5.0	10.2	5.2	6.0	5.6	0
Do	232221	♀	14.8	13.8	9.0	4.0	7.4	5.2	10.2	5.4	6.0	6.0	0
Wyoming:													
Mammoth Hot Springs	208560	♀	14.8	14.1	9.5	4.0	7.3	5.2	10.8	5.3	6.2	5.8	0
Do	208561	♀	14.5	13.6	8.7	4.0	7.1	5.2	10.2	5.4	6.2	5.8	0
Do	208562	♀	15.0	14.0	9.2	4.0	7.4	5.0	10.6	5.6	6.0	5.8	2
Do	208563	♀	15.0	14.3	9.6	4.0	7.2	5.1	11.0	5.5	6.2	5.8	1
Do	208564	♀	15.4	14.8	9.1	3.9	7.3	5.2	11.4	5.7	6.0	6.1	1
Do	208565	♀	15.0	14.3	9.2	4.0	7.4	5.3	10.6	5.5	6.1	5.8	1
Do	208566	♀	15.0	14.2	9.1	3.9	7.2	5.1	10.6	5.4	5.8	5.8	1
Do	208567	♀	-----	14.0	9.6	4.0	7.5	-----	10.9	5.4	6.0	5.8	2
Do	208568	♀	14.8	13.7	9.0	4.1	7.2	5.1	10.6	5.2	5.8	5.6	0
Do	208569	♀	14.8	13.9	-----	3.8	7.4	5.2	10.5	5.3	6.0	5.8	1
Do	208570	♀	15.0	14.2	-----	4.0	7.3	5.1	10.8	5.5	5.8	5.8	2
Do	208571	♀	15.0	14.2	9.0	3.8	7.1	5.1	11.0	5.3	6.0	5.6	0
Do	208573	♀	15.3	14.4	9.0	3.9	7.2	5.1	11.0	5.6	6.0	6.0	2
Do	208574	♀	14.8	14.1	-----	3.8	7.2	5.3	11.0	5.3	6.0	5.6	0
Do	208575	♀	15.0	14.0	9.3	4.0	7.2	5.3	10.8	5.4	6.0	5.7	3
Do	208576	♀	14.8	14.5	9.0	3.9	7.6	5.2	11.1	5.7	5.8	6.0	2

[1] Type

[2] Type of *Myotis pernox* Hollister.

Cranial measurements of Myotis lucifugus—Continued

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis lucifugus carlssima—Con.													
Washington:													
Stehekin	229896	♂	14.0	13.1	8.8	3.8	7.3	5.2	10.2	5.0	5.5	5.5	2
Do	229897	♂	14.4	13.0	-----	3.8	7.2	5.0	10.0	5.0	5.6	5.3	0
Do	230141	♀	14.3	13.6	8.9	4.0	7.2	5.2	10.4	5.4	5.8	5.7	1
Do	230142	♂	14.5	13.7	9.0	4.0	7.2	5.2	10.5	5.3	5.8	5.7	2
Oregon:													
Paulina Lake	204903	♂	14.8	13.5	9.0	4.0	7.6	5.2	10.8	5.1	5.4	5.6	2
Riverside	213909	♂	14.4	13.6	8.7	3.9	7.2	5.0	10.2	5.2	5.6	5.5	0
Steen Mountains	216094	♂	14.4	13.5	9.0	3.9	7.1	5.1	10.0	5.1	5.6	5.5	1
Do	216095	♂	14.3	13.3	-----	3.8	7.2	4.9	-----	5.1	5.7	5.6	0
California:													
Gilmore Lake	12036 U. C.	♂	14.6	13.9	9.1	4.0	7.5	5.2	10.6	5.3	5.6	5.8	1
Yosemite Park	23036 U. C.	♀	14.8	13.8	9.3	4.1	7.5	5.1	10.5	5.4	6.0	5.6	1
Do	[3] 23034 U. C.	♂	15.0	14.1	9.2	4.0	7.4	5.6	11.0	5.5	5.9	5.9	1
Warner Mountains	11351 U. C.	♂	14.6	13.9	8.9	4.0	7.1	5.1	10.7	5.3	5.8	5.6	1
Do	11352 U. C.	♂	14.9	14.0	-----	3.9	7.4	4.9	10.6	5.3	6.0	5.6	1
Donner	100377 U. S. N. M.	♀	14.2	13.2	8.8	4.0	7.4	5.0	10.6	5.2	5.6	5.6	1
Do	100503	♂	14.5	13.6	8.9	4.0	7.3	5.0	10.3	5.2	5.5	5.7	1
Ice Caves	97731	♂	14.7	13.9	8.8	3.7	7.2	5.0	10.5	5.2	5.5	5.7	2
Do	97732	♂	14.3	13.5	9.3	3.7	7.5	5.0	10.6	5.2	5.7	5.8	0
Prattville	98094	♂	14.6	13.5	-----	3.8	7.2	5.1	10.4	5.2	5.5	5.6	0
Lincoln Creek	100378	♂	14.4	13.8	9.0	3.8	7.2	5.3	10.8	5.3	5.8	5.8	3
Near Susanville	98093	♂	14.2	13.5	-----	3.8	7.2	-----	10.3	5.2	-----	5.6	0
Myotis lucifugus phasma													
Colorado:													
Snake River	148158	♀	15.0	14.1	8.9	3.6	7.1	5.0	11.0	5.8	5.9	6.3	0
Do	[4] 148159	♀	14.9	14.2	9.0	3.8	7.1	5.1	11.1	5.9	6.0	6.0	1
Lily	148167	♂	14.6	13.9	-----	3.6	7.0	5.2	10.8	5.7	5.8	5.9	0
California: Argus Mountains.	13295 F.M.	♀	14.5	13.7	-----	3.7	7.4	5.0	10.3	5.3	-----	5.5	0
Myotis lucifugus fortidens													
Tabasco: Teapa	[4] 88. 8. 8. 18 B. M.	♀	15.0	13.8	9.6	3.8	7.4	5.2	-----	5.4	5.8	5.8	1
Texas: Fort Hancock	36121	♀	14.8	14.0	9.4	3.8	7.0	5.0	11.0	5.5	6.2	6.0	1

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[3] Type of *M. yumanensis altipetens* H. W. Grinnell.

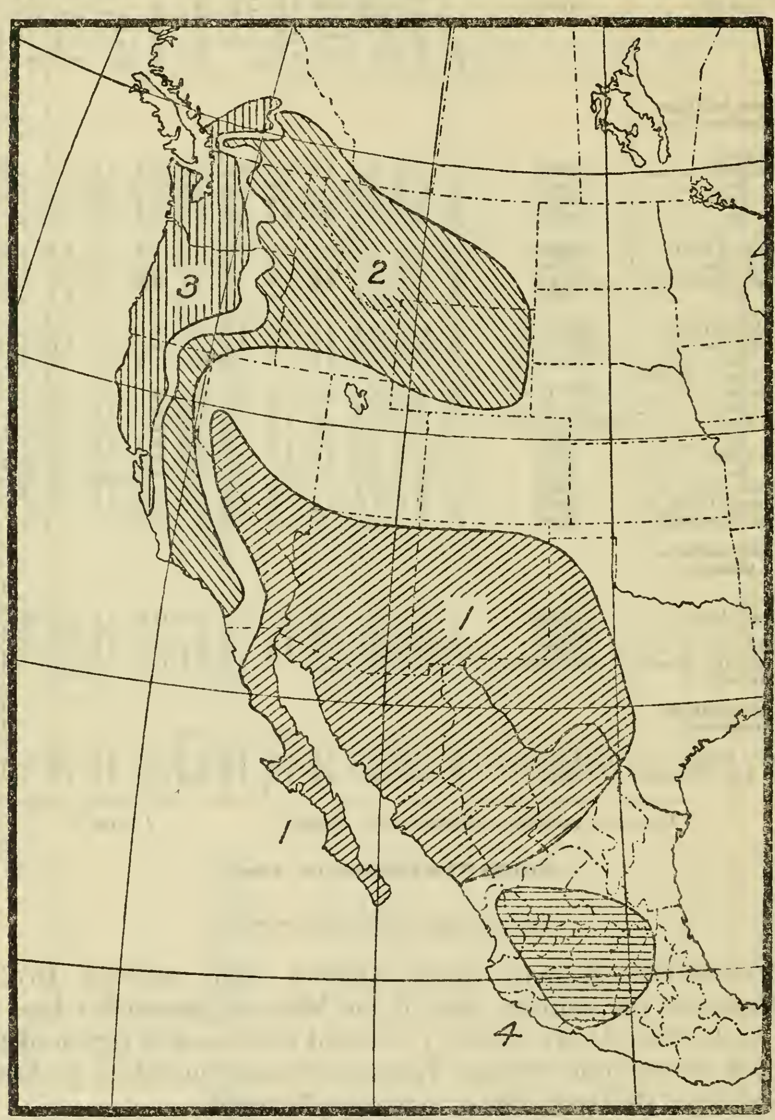
[4] Type.

MYOTIS YUMANENSIS (H. Allen)

(Synonymy under subspecies)

Distribution.—Western North America from southern British Columbia to the southern part of the Mexican plateau (at least as far as the State of Michoacan); eastward over the arid region of the United States from western Texas northward, including probably the whole of the Great Basin, to western Montana.

Diagnosis.—In general like *Myotis lucifugus* but smaller and with relatively somewhat longer tail (average ratio of tail to head and body in 8 specimens from Yuma, Ariz., 81.1; in 10 from Old Fort Tejon, Calif., 81.2; in 10 from Montana, 87.2; and in 10 from San Luis Potosi, 83.4); forearm about 34 mm. (32 to 37 mm.); greatest length of skull ranging from 13.0 to 14.2; maxillary tooth row ranging from 4.6 to 5.2; lower tooth row (excluding incisors) usually less than 5.5 mm. (5.0 to 5.6 mm.). Foot slightly less enlarged than in *M. lucifugus*, its ratio to tibia usually ranging from about 50 to about 54. Skull with abruptly rising forehead. Fur of back dull as compared with that of *M. lucifugus*, the longer hairs lacking conspicuous burnished tips.



MAP 2.—DISTRIBUTION OF MYOTIS YUMANENSIS: 1, M. YUMANENSIS YUMANENSIS; 2, M. YUMANENSIS SOCIABILIS; 3, M. YUMANENSIS SATURATUS; 4, M. YUMANENSIS LUTOSUS

Ears.—The ears are of moderate length; when laid forward they reach to the nostril (alcoholic specimens). When the ear is held erect, the lower third of its external border forms a strongly jutting shoulder, above which the margin is very slightly convex, then very slightly concave to the bluntly rounded tip. The result is that the upper two-thirds of the ear conch appears to be narrowed and with a nearly straight posterior margin. In *Myotis lucifugus* the basal shoulder is much less pronounced and the conch itself is wider so that the outer edge is more nearly straight from base to tip, the upper part of the ear is not so narrowed, and its general appearance is less scimitar-shaped.

The tragus differs from that of *Myotis lucifugus* in the size and form of the basal lobe; this lobe is larger in proportion and nearly semicircular in outline; the tragus is about one-half the height of the ear from meatus (7:13.5 mm.). The anterior edge is nearly straight, the posterior slightly convex above the base, then tapering in the upper third to the bluntly rounded tip. The upper third of the posterior edge is often slightly crenulate.

Wing and membranes.—The wing membrane arises from the tarsus just proximal to the bases of the toes. The metacarpals are distinctly graduated, the third longest, the fourth slightly shorter, the fifth again shorter (about 2 mm. less than the third). When folded, the third metacarpal falls from 1 to 2 mm. short of the elbow (as compared with 2–5 mm. in *M. lucifugus*). Taking the third finger as 100, the fourth is 85, the fifth 79 (56:48:44.5 mm.). The first phalanx of the fourth finger is about 1 mm. shorter than the second (8:9 mm.); but in the fifth finger the opposite relation obtains, for the first is a very little longer than the second (7.5:7), or they are practically equal (7.5:7.5). The minute terminal vertebra of the tail is the only one free from the membrane. Under a lens may be seen numerous short stiff hairs springing in several rows from close along the free edge of the interfemoral membrane; they do not, however, form a fringe.

Foot.—The foot is proportionally stout and long, the ratio of its length to that of tibia ranging from about 50 to about 54. The innermost toe is slightly but evidently shorter than the others, the tip of its claw reaching only a little beyond the base of the claw of digit 2. The long calcar extends three-fifths of the distance from the heel to the tail, and ends in a minute lobule. It is quite without projecting keel.

Fur.—The pelage is full and of medium length, the hairs about 5 mm. long on the lower back, bicolored; dark bases are evident everywhere except on the lower abdomen. The fur extends out on to the interfemoral membrane slightly beyond a line joining the knees, above and below. Underneath, the wings are thinly haired nearly three-fourths the distance to the elbow. The paler tips of the dorsal hairs are shorter and less glossy than those of *Myotis lucifugus*, with the result that *M. yumanensis* usually appears very dull colored in contrast to *M. lucifugus* with its deeper, more glossy fur. It is ordinarily possible to separate out the two species in a mixed series by recourse to this character alone.

Skull.—The skull, as compared with that of *Myotis lucifugus*, is not only smaller in size (total length 13.2 to 14.2 mm. instead of 14.0 to 15.8 mm.) but different in proportions. When the skull is viewed in lateral profile the alveolar line appears to rise from behind forward at a more abrupt angle, the forehead seems more pronounced and higher, so that the rostrum is separated from the brain case by a more obvious concavity, and the occiput is relatively more elevated. The entire brain case as seen from above has a more distinctly globular aspect. The temporal ridges, even in adults, are barely discernible, but sometimes they unite to form a low crest. This crest is so rarely developed that we have found it in only 9 of 70 adult skulls. Even when obvious the crest is noticeably flat-topped and much broader than high, while that of *M. lucifugus*, posteriorly at least, is of the usual narrowly ridgelike form if developed at all. The posterior outline of the occiput when viewed from above is distinctly more abrupt in its curvature than that of *M. lucifugus.* All these differences are, in such small objects, very minute and at first sometimes difficult to appreciate, but they are, nevertheless, striking when carefully studied.

Teeth.—The teeth resemble in general those of *Myotis lucifugus.* Maxillary tooth rows rather narrow in proportion to the width of palate between them, in this character agreeing perfectly with those of *M. lucifugus.* Upper molars with the full complement of secondary ridges and a well-developed protoconule. The cingulum at its maximum development resembles that of *M. lucifugus lucifugus*, but many individuals occur in which it is greatly reduced, frequently to such a degree as to be nearly or quite absent from the entire lingual border of the crowns. The small premolar teeth are remarkably uniform in their relations. In the upper jaw p^2 and p^3 are both drawn inward a little from the tooth row so that the anterior small tooth is overlapped by the cingulum of the canine and the posterior is overlapped to a slightly less degree by the cingulum of p^4. In cross-section p^3 is only a little less than p^2 but in profile it is much lower. The cusps of both are broadly triangular and blunt in side view, that of the smaller tooth (p^2) reaching a level not exceeding half the height of the anterior tooth. In *Myotis lucifugus* they are usually more slender and lancet-shaped.

Remarks.—This species is structurally much like *Myotis lucifugus* but its size is uniformly less and the foot is, on the average, less enlarged. The pelage is shorter and not so glossy (on account of the shorter glistening tips of the long hairs) and the skull is less flattened and with a slightly more upturned muzzle. The ears are thinner and narrower and usually less heavily pigmented. All these differences are, of course, best appreciable on direct comparison.

Very little is recorded concerning the natural history of *Myotis yumanensis.* It is probably less of a forest haunter than *Myotis lucifugus*, preferring more open country with scattered tree growth, though representatives of the two species occur together on the Pacific coast, as well as in Montana and elsewhere. Mrs. Grinnell (1918) records a large breeding colony that frequented the old ruined buildings of Fort Tejon, Kern County, Calif. The adult males apparently leave the colony when the young are born, and during summer they may wander up to a considerable altitude in the open woods of the dry mountain country. In the San Bernardino Mountains, Calif., Mrs. Grinnell notes the capture of a male at 8,500 feet elevation, and another was taken at 11,000 feet on the east slope of Mount Whitney, Calif., along a small watercourse at the limit of tree growth (G. M. Allen, 1919). A. B. Howell (1920) recounts the discovery of a large colony that frequented an abandoned mine tunnel in California. A single young is the rule, and the breeding season is early, at least in Texas, where on May 26, at Del Rio, Gaut found a colony with young clinging to the old ones (Bailey, 1905).

Of the geographical races into which *Myotis yumanensis* is divided the most widespread is a dull-brownish form occupying a considerable area of the interior from at least western Montana south through central California. In the humid coastal area from the central part of California into Washington and southern British Columbia this color becomes considerably darker, and again, in the desert country of southeastern California, Arizona, and parts of Texas it changes to an extreme of pallor. In the southern part of the Mexican highlands, again, there is a dark-brown race, the limits of whose distribution are yet undetermined. Throughout this range, however, there is very little variation in size, a character which, together with its dull, short pelage and narrow-tipped ears, will usually serve to distinguish *Myotis yumanensis* from *Myotis lucifugus* where the two species occur together.

MYOTIS YUMANENSIS YUMANENSIS (H. Allen)

Vespertilio yumanensis H. Allen, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 58, fig. 54–56, June, 1864.—Dobson, Catal. Chiroptera Brit. Mus., pp. 328, 329, 1878.—H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43, (1893), p. 72, March 14, 1894.

Vespertilio obscurus H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 281 (Lower California).—Miller, North Amer. Fauna, No. 13, p. 69, October 16, 1897 (as synonym of *M. californicus*).—Lyon and Osgood, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 272, January 28, 1909.—Goldman, Proc. Biol. Soc. Washington, vol. 27, p. 102, May 11, 1914.

Vespertilio macropus H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 288, not of Gould, 1854 (Fort Mohave, Colorado River, Arizona).—Lyon and Osgood, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat Mus., No. 62, p. 271, January 28, 1909.

Vespertilio nitidus (pedomorphic variety) H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), pp. 72, 73, March 14, 1894.

Vespertilio albescens H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 87, March 14, 1894 (part, not of Geoffroy, 1805).—Trouessart, Catal. Mamm. viv. foss., p. 132, 1897 (part).

Vespertilio nitidus macropus H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 100, March 14, 1894.—Trouessart, Catal. Mamm. viv. foss., p. 130, 1897.

Myotis yumanensis Miller, North Amer. Fauna, No. 13, p. 66, October 16, 1897 (part).—Elliot, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 403, March, 1901 (part); List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901 (part).—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 256, December 27, 1901 (part).—Trouessart, Catal. Mamm. viv. foss., suppl., p. 92, 1904.—Elliot, Field Columb. Mus., publ. 91, zool. ser., vol. 3, p. 318, March, 1904 (part); Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, pt. 2, p. 576, 1904 (part); Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 475, 1905 (part).—Stephens, California Mammals, p. 267, 1906 (part).—Elliot, Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 501, 1907 (part).—Lyon and Osgood, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 291, January 28, 1909.—Warren, Mammals of Colorado, p. 273, 1910.—Bailey, North Amer. Fauna, No. 35, pp. 19, 33, September 5, 1913.—A. B. Howell, Journ. Mamm., vol. 1, p. 173, August 24, 1920.—J. Grinnell, Univ. California Publ. Zool., vol. 21, p. 314, January 27, 1923.

Myotis yumanensis yumanensis Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 56, December 31, 1912 (part).—J. Grinnell, Proc. California Acad. Sci., ser. 4, vol. 3, p. 276, August 28, 1913.—H. W. Grinnell, Univ. California Publ. Zool., vol. 17, p. 273, January 31, 1918.—Miller, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 69, April 29, 1924.

Myotis californicus durangæ J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 19, p. 612, November 12, 1903 (San Gabriel, Rio Sestin, Durango, Mexico); Bull. Amer. Mus. Nat. Hist., vol. 20, p. 210, May 28, 1904.—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, pt. 2, p. 579, 1904; Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 478, 1905.—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 56, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 71, April 29, 1924.

Myotis californicus durangoœ Trouessart, Catal. Mam. viv. foss., suppl., p. 93, 1904 (variant).

Myotis yumanensis sociabilis G. M. Allen, Journ. Mamm., vol. 1, p. 1, November 28, 1919 (not of H. W. Grinnell).

Myotis yumaensis yumaensis Strecker, Check-List Mamm. Texas, The Baylor Bulletin, Baylor University, Waco, Texas, vol. 29, No. 3, p. 9, August, 1926.

Type locality.—Old Fort Yuma, Imperial County, Calif., on right bank of Colorado River, opposite the present town of Yuma, Ariz.

Type specimen.—In his original description, H. Allen (1864) mentions by number, four specimens (5387, 6019–21, U.S.N.M.) in alcohol, all from Fort Yuma, Imperial County, Calif., collected by Maj. Gen. George H. Thomas. Lyon and Osgood (p. 291) were unable to trace these specimens 20 years ago, and we have fared no better.

Distribution.—Interior desert country of the Great Basin, from the eastern edge of the Sierra Nevada of California eastward into western Texas, and south into Lower California and in Mexico to the State of Durango.

Northward range yet to be determined; but the pale desert race evidently merges into the darker *M. yumanensis sociabilis* somewhere in Utah and Nevada. Skins are lacking to determine the exact status of the race inhabiting southern Lower California. The supposed occurrence of *Myotis yumanensis yumanensis* in Colorado (Cary, 1911) turns out to rest on a misidentification of *M. lucifugus phasma*, though it is not unlikely that the smaller animal will eventually be found in the western part of that State.

Diagnosis.—Palest subspecies of *Myotis yumanensis;* buffy above, nearly white beneath.

Description.—Color above very pale buffy, nearly pinkish buff or pale, dull, cream buff (Ridgway, 1912), the hairs dark, near fuscous, for the basal half. Below, pale cartridge buff, the basal half of the hairs fuscous except in the posterior region where they are whitish throughout. The membranes are pale brownish, translucent, usually edged with white along the interfemoral border and at the tip of the tail as well as on the edges above the ankles. Specimens in immature pelage are less pallid, nearly cinnamon buff above.

Measurements.—For measurements see tables, pages 73, 75.

Specimens examined.—Total number 354, from the following localities:

ARIZONA: Ehrenberg, 13 alc. (U.S.N.M.); Fort Mohave, 1 skin (U.S.N.M.), type of *macropus;* Fort Verde, 5 skins (A.M.N.H.); Gila Bend, 3 skins (U.S.N.M.); Huachuca Mountains, Cochise County, 1 skull (F.M.); Jacob's Pool, 1 skin (U.S.N.M.); Rice (San Carlos Indian Reservation), 2 skins, 2 alc. (U.S.N.M.), nearly typical; Safford, 1 alc. (U.S.N.M.); Tucson, 1 skin (U.S.N.M.); Yuma, 9 alc. (U.S.N.M.).

CALIFORNIA: Argus Mountains, Inyo County, 1 skin (F.M.); Carrell Creek, Inyo County, 1 skin (U.C.); Fort Yuma, Imperial County, 4 skins, 2 alc. (U.S.N.M.); Lone Pine, Inyo County, 1 skin (M.C.Z.), 2 alc. (U.S.N.M.); Mount Whitney, Tulare County, 11,000 ft., 1 skin (M.C.Z.), 1 alc. (U.S.N.M.); Owens Lake, Inyo County, 4 alc. (U.S.N.M.); Potholes, Imperial County, 1 skin (U.C.), 1 alc., 2 skins (M.C.Z.).

COLORADO: Colorado River, Horse Shoe Bend, 1 alc. (U.S.N.M.).

DURANGO: Arroyo de Bucy, 1 skin (A.M.N.H.); Rio Sestin, 6 skins, including type of *durangæ* (A.M.N.H.); San Gabriel, 5 alc. (A.M.N.H.).

LOWER CALIFORNIA: [?Cape St. Lucas], 2 alc. (U.S.N.M.), including type and paratype of *obscurus*; Rancho San Antonio (west base of San Pedro Martir Mountains), 8 skins, 10 alc. (U.S.N.M.); Rio Pescadero, 1 skin (U.S.N.M.).

NEW MEXICO: Clayton, 1 skin not typical (U.S.N.M.); Rinconada, 1 alc. (U.S.N.M.).

NEVADA: Colorado River, 1 alc. (U.S.N.M.); Pyramid Lake, 24 skins, 198 alc. (U.S.N.M.).

SONORA: Colonia Lerdo, 6 skins, 18 alc. (U.S.N.M.); no exact locality, 1 alc. (U.S.N.M.).

TEXAS: Del Rio, Valverde County, 9 skins (U.S.N.M.); Marathon, 1 skin (U.S.N.M.).

MYOTIS YUMANENSIS SOCIABILIS H. W. Grinnell

Myotis yumanensis MILLER, North Amer. Fauna, No. 13, p. 66, October 16, 1897 (part).—TROUESSART, Catal. Mamm. viv. foss., p. 1283, 1899 (part).—ELLIOT, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 403, March, 1901 (part); List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June 1901 (part).—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 256, December 27, 1901 (part).—ELLIOT, Field Columb. Mus., publ. 91, zool. ser., vol. 3, p. 318, March, 1904 (part); Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 576, 1904 (part).—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 92, 1904 (part).—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 475, 1905 (part).—STEPHENS, California Mammals, p. 267, 1906 (part).—ELLIOT, Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 501, 1907 (part).—MILLER, List North Amer. Land Mamm. 1911, Bull, U. S. Nat. Mus., No. 79, p. 56, December 31, 1912 (part).—J. GRINNELL, Proc. California Acad. Sci., ser. 4, vol. 3, p. 276, August 28, 1913 (part).—J. GRINNELL and SWARTH, Univ. California Publ. Zool., vol. 10, p. 380, October 31, 1913.

Myotis lucifugus longicrus J. GRINNELL, Univ. California Publ. Zool., vol. 5, p. 158, December 31, 1908 (not of True).

Myotis yumanensis sociabilis H. W. GRINNELL, Univ. California Publ. Zool., vol. 12, p. 318, December 14, 1914; Univ. California Publ. Zool., vol. 17, p. 276, January 31, 1918.—A. B. HOWELL, Journ. Mamm., vol. 1, p. 173, December 4, 1920.—J. GRINNELL, Univ. California Publ. Zool., vol. 21, p. 314, January 27, 1923.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 69, April 29, 1924.

Myotis yumanensis subsp., DICE, Journ. Mamm., vol. 1, p. 11, November 28, 1919.

Type locality.—Old Fort Tejon, Tehachapi Mountains, Kern County, Calif.

Type specimen.—Adult female, skin and skull, No. 5158, Museum of Vertebrate Zoology, University of California, collected at Old Fort Tejon, Tehachapi Mountains, Kern County, Calif., July 23, 1904, by Joseph Grinnell.

Distribution.—From southeastern British Columbia and western Montana to the eastern base of the Cascade Mountains in central Washington and Oregon, thence southward in California (excepting the humid coastal strip which extends as far south as San Luis Obispo County) to the coast of the southern part of the state.

Diagnosis.—Color intermediate between that of the pallid *Myotis yumanensis yumanensis* of the deserts and the dark *M. yumanensis saturatus* of the humid northwest coast.

Color.—General color above very near tawny-olive of Ridgway (1912). Below dull whitish with a tinge of buffy. Except about the anal region the hairs are everywhere dark at their bases, nearly fuscous. Ears and membranes translucent, pale brownish in color. Specimens in immature pelage are darker above, nearly sepia. The terminal part of the interfemoral membrane is often whitish, and occasionally the extreme edge of the wing membranes as well.

Measurements.—For measurements see tables, pages 73 and 75.

Specimens examined.—Total number 248, from the following localities:

BRITISH COLUMBIA: Kamloops, 1 skin, nearly typical (A.N.S.P.); Mount Lehman, 1 skin (A.M.N.H.); Sicamous, 3 alc. (A.N.S.P.).

CALIFORNIA: Alturus Lake, Modoc County, 1 alc. (U.S.N.M.); Beswick, Siskiyou County, 2 skins (U.S.N.M.), nearly typical; Capistrano, Orange County, 1 skin (U.S.N.M.); Cassel, Shasta County, 1 alc. (U.S.N.M.); Chalk Peak, Monterey County, 1 skin (U. C.); Chico, Sacramento River, Butte County, 1 skin (U.S.N.M.); Eagle Lake, Lassen County, 2 skins, 2 alc. (U.S.N.M.); Fort Tejon, Kern County, 48 skins including type (U. C.), 1 skin (U.S.N.M.), 4 skins (A.M.N.H.), 1 skin (F. M.), 1 skin (A.N.S.P.), 11 alc. (U.S.N.M.); Fresno, Fresno County, 4 alc. (U.S.N.M.); near Fruto, Glenn County, 1 skin (U. C.); Nevada City, Nevada County, 2 alc. (U.S.N.M.); near Oroville, Butte County, 1 skin (U. C.); San Bernardino Mountains, San Bernardino County, 1 alc. (B. M.); San Luis Rey, San Diego County, 8 alc. (U.S.N.M.); Tulare, Tulare County. 30 alc. (U.S.N.M.); no exact locality, 4 alc. (U.S.N.M.).

IDAHO: Payette Valley, 1 skin (U. C.).

MONTANA: Belton, 1 skull (U.S.N.M.); Corvallis, 36 skins, 48 alc., 1 skull (U.S.N.M.); Flathead Lake, Flathead County, 7 alc. (U.S.N.M.); Powderville, 1 skull (U.S.N.M.).

OREGON: Klamath Falls, 8 skins (U. C.), 1 alc. (U.S.N.M.); Lone Rock, 2 alc. (U.S.N.M.).

WASHINGTON: Chelan, 3 alc. (U.S.N.M.); Stehekin, 3 skins (U.S.N.M.); Fort Walla Walla, 1 alc. (U.S.N.M.).

WYOMING: Fremont Peak, 1 skin (U.S.N.M.).

"NORTHWESTERN AMERICA": 1 skin (B. M.).

Remarks.—Myotis yumanensis sociabilis is intermediate in color between the typical form of *Myotis yumanensis* and the dark *M. yumanensis saturatus* of the northwest coast, but the color characters are fairly uniform over a wide area. In geographic variation *Myotis yumanensis* parallels other members of the genus; for example, *Myotis* *volans* and *M. lucifugus*, in which there is a saturate dark form confined to the humid northwest coast, a pallid race characteristic of the hot arid interior and an intermediate form covering a wide area between. The present race is usually distinguishable at a glance from *Myotis yumanensis saturatus* by its brownish ears and membranes and lighter brown fur, and from the typical *yumanensis* by its dull brown instead of pale buffy color. In a series from western Montana (Corvallis) the forearm is unusually long, 20 specimens averaging 35.5, with extreme as high as 36.7. In *M. lucifugus* from the same place, the forearm is 39 mm. Specimens from Shasta and Siskiyou Counties, Calif., are so perfectly intermediate between *sociabilis* and *saturatus* that they might be equally well placed under either form. The more exact definition of the eastward range and the determination of the area of intergradation with the typical subspecies are yet to be worked out in detail.

MYOTIS YUMANENSIS SATURATUS Miller

Myotis yumanensis saturatus Miller, North Amer. Fauna, No. 13, p. 68, October 16, 1897.—Trouessart, Catal. Mamm. viv. foss., p. 1283, 1899.—Elliot, Field Columb. Mus., publ. 32, zool. ser., vol. 1, p. 276, March, 1899; Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 403, March, 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901.—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 256, December 27, 1901.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 93, 1904.—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 475, 1905.—Stephens, California Mammals, p. 267, 1906.—Elliot, Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 502, 1907.—Lyon and Osgood, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 273, January 28, 1909.—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 19, p. 56, December 31, 1912.—J. Grinnell, Proc. California Acad. Sci., ser. 4, vol. 3, p. 277, August 28, 1913 (part).—H. W. Grinnell, Univ. California Publ. Zool., vol. 17, p. 278, January 31, 1918.—G. M. Allen, Journ. Mamm., vol. 1, p. 1, November 29, 1919.—Miller, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 70, April 29, 1924.

Type locality.—Hamilton, Skagit County, Wash.

Type specimen.—Adult male, skin and skull No. $\frac{17399}{24306}$ United States National Museum (Biological Survey collection), collected at Hamilton, Skagit County, Wash., September 13, 1889, by T. S. Palmer. Original number 392.

Distribution.—Humid northwest coast from southern British Columbia south to south-central California (San Luis Obispo County) and to a varying distance inland west of the higher mountains.

Diagnosis.—Like *Myotis yumanensis yumanensis* and *M. y. sociabilis* but color much darker.

Color.—Above, the tips of the hairs are usually a dull sepia, the bases slate-black; below, the tips of the hairs are buffy in the mid-ventral region, washed on the throat and sides with sepia, their bases slate-black except for a small area at the base of the tail where they are buffy throughout. The ears and membranes are blackish brown, very dark. In some lights the paler tips of the hairs on the back are glossy, with a brassy sheen, but not to the same extent as in the race of *Myotis lucifugus* occurring with it. Frequently the whole lower surface inclines to a dull buffy tint. The general effect is a small, large-footed, dull-haired bat of uniformly dark color. Immature specimens are even darker, a dull blackish brown above, washed below with smoky.

Measurements.—For measurements see tables, pages 74 and 75.

Specimens examined.—Total number 64, from the following localities:

BRITISH COLUMBIA: Chilliwack, 1 skin (F. M.); Kamloops, 1 skin (U.S.N.M.); Okanagan, 1 skin (B. M.), nearly typical; Port Moody, 1 skin (U.S.N.M.); Shuswap, 1 skin (U.S.N.M.); Westminster, 2 skins (A. M. N. H.).

CALIFORNIA: Baird, Shasta County, 1 skin (U.S.N.M.), nearly typical; Cuddeback, Humboldt County, 1 skin (U. C.); Lake Leonard, Mendocino County, 1 skin (U. C.); Menlo Park, San Mateo County, 1 alc. (U.S.N.M.); Nicasio, Marin County, 2 alc. (U.S.N.M.); San Carpojo Creek, 7 miles north of Piedras Blancas, San Luis Obispo County, 1 skin (U. C.).

OREGON: Blaine, Tillamook County, 3 skins (U. C.), 2 skins (A. Walker); Columbia River, 1 skin (A.N.S.P.); Crooked River, Crook County, 1 alc. (U.S.N.M.); McKenzie Bridge, Lane County, 3 skins (U.S.N.M.); Mohler, Tillamook County, 1 skin (U. C.); Roseburg, Douglas County, 1 alc. (U.S.N.M.); Twelve Mile Creek, 1 alc. (U.S.N.M.); Vida, Lane County, 1 skin (U.S.N.M.); Wedderburn, Curry County, 1 skin (U.S.N.M.); Wilson River, Tillamook County, 1 skin (U.S.N.M.); no exact locality, 1 skin (A.N.S.P.).

WASHINGTON: Goldendale, 2 alc. (U.S.N.M.); Hamilton, 1 skin (U.S.N.M.); Husum, 1 skin (U.S.N.M.); Lake Cushman, 1 skin (U.S.N.M.), 1 skin (M. C. Z.), 8 skins, 5 alc. (U. M.); Lake Quinault, 2 skins (U.S.N.M.); Lake Washington, 1 skin (U.S.N.M.); Mabton, 1 alc. (U.S.N.M.); Neah Bay, 1 alc. (U.S.N.M.); Nesqually Flats, 5 alc. (A.N.S.P.); North Yakima, 1 alc. (U.S.N.M.); Roy, 2 skins (U.S.N.M.), not typical; Stevenson, 1 skin (U.S.N.M.).

Remarks.—The form of *Myotis yumanensis* occurring on the Northwest Coast closely parallels the race (*alascensis*) of *Myotis lucifugus* which is found in the same region, so that, in collections of skins from northwestern localities, the two are often confused. Usually *saturatus* is recognizable by its smaller size, narrower ear, and duller coat, without reference to the skull.

MYOTIS YUMANENSIS LUTOSUS, new subspecies

Myotis yumanensis Miller, North Amer. Fauna, No. 13, p. 66, October 16, 1897 (part).

Type.—Adult female, skin and skull, No. 50783, United States National Museum (Biological Survey collection), from Patzcuaro, Michoacan, Mexico. Collected July 17, 1892, by E. W. Nelson.

Distribution.—Southern portion of the Mexican highlands.

Diagnosis.—Color darker and richer than in *Myotis yumanensis sociabilis;* underparts distinctly washed with brownish.

Color.—The color differs conspicuously from that of the typical form of *Myotis yumanensis*, being a dark cinnamon brown above, nearly Prout's brown (Ridgway, 1912), the bases of the hairs in adults but very little darker. Below, the extreme bases of the hairs, except in the anal region, are blackish brown, paling into fuscous in their upper part and tipped with dull gray, the entire ventral surface, especially at the sides, having a faint brownish wash. Ears and membranes dull brownish, the tip of the tail paler.

Measurements.—For measurements see tables, pages 74 and 76.

Specimens examined.—Total number 33, from the following localities:

JALISCO: 2 alc. (B.M.).
MICHOACAN: El Molino, 1 alc. (U.S.N.M.); Patzcuaro, 2 skins, 7 alc. (U.S.N.M.).
SAN LUIS POTOSI: Ahualulco, 9 alc. (U.S.N.M.); La Parada (Hda.), 3 alc. (U.S.N.M.); Jesus Maria, 7 alc. (U.S.N.M.).
ZACATECAS: San Juan Capistrano, 1 skin, 1 alc. (U.S.N.M.).

Remarks.—In its dull brownish (muddy) color this Mexican bat resembles *Myotis yumanensis sociabilis*, but the brown is slightly richer, and in the adults there is very little contrast between the tips and the bases of the hairs above. The darker belly with its distinct brownish wash is also apparently characteristic. An immature specimen from Zacatecas, Mexico, is slightly paler and the hairs of the upper parts are rather distinctly bicolor. Between the ranges of these two dark forms, typical *yumanensis* with its pale coloration intervenes. Thus far very few specimens of the Mexican race have been available. Hence the exact definition of its range must await further collecting.

External measurements of Myotis yumanensis

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis yumanensis yumanensis													
Nevada:													
Pyramid Lake	245289	♀	44.0	37.0	16.0	8.0	36.5	6.0	33.5	31.5	13.0	11.5	7.5
Do	245291	♀	41.5	-----	15.0	7.0	34.0	6.5	32.0	30.5	12.5	10.5	7.0
Do	245292	♀	40.5	33.5	16.5	8.0	37.0	6.5	34.0	32.0	12.5	11.0	7.5
Do	245299	♀	44.0	34.5	16.5	7.0	36.0	6.0	33.5	32.0	12.5	10.0	8.0
Do	245309	♀	41.5	27.0	15.0	7.0	34.0	6.5	32.0	31.0	12.0	10.0	8.0
Do	245310	♀	40.0	34.0	14.0	8.0	34.0	6.5	31.5	30.5	11.0	9.0	9.0
Do	245323	♀	40.0	33.0	15.0	7.5	35.0	6.5	32.5	31.0	12.0	11.0	7.0
Do	245325	♀	40.0	36.0	15.5	8.0	36.0	7.0	33.0	31.5	12.0	10.5	8.0
Do	245338	♀	42.5	35.0	16.0	7.5	36.0	7.0	33.0	32.0	12.0	11.0	7.5
Do	245345	♀	40.0	34.0	15.0	8.5	35.5	6.5	33.5	32.0	12.0	10.0	8.0
California:													
Fort Yuma	61543	♀	42.5	35.0	15.0	8.0	35.5	6.0	32.5	30.5	11.5	10.5	8.5
Do	61544	♂	41.5	35.5	16.0	7.6	34.5	6.0	31.5	30.0	13.0	11.5	8.5
Lone Pine	28971	♀	44.0	36.5	17.0	9.0	36.0	7.0	34.0	32.0	12.5	10.0	8.5
Do	28972	♀	43.0	30.0	15.0	8.0	34.0	6.5	30.5	28.0	12.0	11.0	7.0
Owens Lake	28952	♀	44.5	33.0	16.5	7.5	34.5	6.0	32.5	31.0	11.0	10.0	7.5
Do	28955	♀	44.5	32.0	16.0	8.5	36.0	5.5	32.5	31.5	14.0	11.0	8.5
Do	28957	♀	42.5	34.5	-----	8.0	36.5	5.5	33.5	31.0	12.5	10.0	8.0
Arizona:													
Ehrenburg	131966	♂	46.5	33.0	16.5	8.5	33.5	6.5	32.0	31.0	13.0	11.0	8.5
Do	131968	♂	44.0	33.5	15.0	8.5	33.5	6.5	31.5	30.0	14.0	12.0	8.0
Do	131971	♀	43.0	36.0	15.5	8.5	35.0	6.5	32.0	31.0	13.0	12.0	7.5
Do	131972	♀	44.5	37.0	16.0	8.0	35.0	6.0	33.0	30.5	14.0	11.5	8.5
Do	131975	♀	39.0	34.0	14.0	8.0	34.5	5.5	32.5	30.5	12.5	11.0	8.0
Safford	206415	♀	42.0	32.5	14.0	8.5	35.0	5.5	32.5	30.5	13.5	11.0	8.5
Yuma	53076	♂	44.5	36.8	15.0	8.0	33.5	6.0	31.0	29.0	13.0	12.0	8.5
Do	99681	♂	46.5	35.4	15.5	8.5	35.0	7.0	32.5	30.5	13.0	10.5	8.0
Do	99683	♂	45.5	35.6	14.5	8.0	33.0	7.0	30.5	29.5	13.0	11.5	8.0
Do	99684	♀	45.0	37.2	16.0	8.0	35.0	7.0	33.0	31.5	13.5	11.5	9.0
Do	99685	♀	44.0	36.5	15.0	8.5	35.0	6.0	32.5	30.5	11.0	10.0	8.0
Do	99686	♀	43.0	36.0	15.0	8.0	35.0	5.5	31.5	30.0	13.0	10.5	8.0
Do	99687	♀	41.0	33.2	15.0	8.0	33.5	5.5	32.0	30.0	13.0	11.5	7.0
Do	99688	♂	43.0	36.0	15.5	8.0	35.5	7.0	33.0	31.0	13.5	10.5	7.5
New Mexico:													
Rinconada	133723	♂	41.5	34.0	15.0	8.0	34.0	6.5	31.5	30.0	13.0	11.5	8.5
Lower California:													
Rancho San Antonio	147616	♀	41.0	37.5	14.5	8.0	34.5	6.0	32.5	31.0	14.5	12.0	8.5
Do	147620	♀	40.0	34.5	15.5	8.5	35.5	5.5	33.0	31.5	14.5	12.0	8.0
Do	147621	♀	41.5	35.5	15.0	8.5	33.0	6.5	31.0	28.0	13.5	11.0	7.5
Do	147622	♀	40.5	36.0	15.0	8.0	35.0	6.5	32.5	31.0	13.5	11.0	9.0
Sonora:													
Colonia Lerdo	137021	♀	44.0	35.5	15.0	8.5	36.0	7.0	33.0	32.5	12.5	11.0	8.0
Do	137022	♀	42.5	37.0	15.5	8.0	36.0	6.5	33.0	32.0	13.5	11.0	8.0
Do	137025	♀	43.5	35.0	15.5	8.5	34.5	6.5	31.5	30.0	13.0	10.5	8.0
Do	137028	♀	43.0	37.5	16.0	9.0	35.5	6.5	33.0	31.0	14.0	12.0	7.5
Do	137029	♀	41.5	32.0	16.0	8.5	35.0	6.0	32.5	29.0	12.5	11.0	8.0
Do	137031	♀	43.0	34.5	15.0	8.0	34.0	6.0	31.5	30.0	13.0	11.0	7.5
Do	137032	♀	43.0	35.0	15.5	8.5	35.0	6.5	32.5	31.0	12.5	11.5	8.0
Do	137034	♀	40.5	33.5	15.5	8.5	35.5	6.0	32.5	30.0	12.5	11.0	8.0
Do	137036	♀	43.0	36.0	15.5	8.5	35.5	7.0	32.5	30.0	14.0	11.5	8.5
Do	137038	♀	41.0	35.0	15.0	7.5	34.0	6.0	32.5	30.5	14.0	10.0	9.0
Myotis yumanensis sociabilis													
Montana:													
Corvallis	203700	♀	42.0	37.0	16.5	8.5	37.0	7.0	33.0	32.0	13.0	12.0	9.0
Do	203701	♀	40.0	35.5	15.5	8.5	36.5	7.5	34.0	32.0	14.5	12.5	9.0
Do	203705	♀	46.0	37.0	16.0	9.0	37.0	7.5	33.5	32.5	14.0	13.0	9.0
Do	203709	♀	44.0	38.0	17.2	9.0	38.0	7.0	36.0	33.6	14.2	12.0	9.0
Do	203710	♀	44.2	37.0	16.0	8.4	36.6	7.0	33.8	31.6	13.0	12.4	8.0
Do	203711	♀	40.2	37.8	16.4	8.4	36.2	6.0	32.8	31.0	13.0	11.0	9.6
Do	203712	♀	44.8	38.0	16.0	9.2	37.0	6.6	33.4	32.6	14.0	12.0	8.0
Do	203714	♀	45.0	37.8	16.0	9.2	37.0	7.0	33.8	31.8	13.2	11.2	8.2
Do	203715	♀	43.0	32.0	15.0	8.2	36.4	7.0	32.8	30.0	14.0	11.8	8.4
Do	203716	♀	42.0	36.0	15.4	8.2	37.0	7.0	34.0	32.4	12.4	11.4	8.0
Do	203686	♂	41.4	33.8	16.0	9.4	35.4	7.0	31.2	31.0	14.0	11.0	8.4
Do	203728	♂	44.0	34.6	16.0	8.0	32.4	6.8	32.4	31.2	13.0	11.0	8.0
Flathead Lake	73170	♂	42.0	34.0	15.8	8.4	35.0	6.4	33.0	31.0	13.0	10.4	8.2
Do	73175	♂	42.0	36.2	17.2	8.0	37.0	6.4	33.6	32.0	13.0	10.4	8.4
Washington:													
Chelan	30311	♀	43.0	32.2	15.4	7.4	36.0	6.2	32.0	30.2	12.8	10.8	9.0
Do	30312	♀	42.6	34.8	14.6	8.4	36.2	7.0	33.0	31.2	13.2	11.2	8.4

External measurements of Myotis yumanensis—Continued

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis yumanensis sociabilis—Continued													
Washington—Continued.													
Chelan	30313	♀	43.8	34.0	15.0	7.6	36.8	6.4	34.6	32.0	13.0	11.4	8.4
Fort Walla Walla	15013	♀	42.6	35.8	16.0	8.0	36.0	6.0	33.0	31.0	13.2	11.4	8.0
Oregon:													
Klamath	187395	♀	44.2	33.8	16.0	7.2	35.2	6.0	32.0	30.4	13.0	12.0	8.4
Lone Rock	79299	♂	40.0	33.0	14.2	6.2	33.2	6.0	31.6	30.8	12.0	10.2	7.0
Do	79300	♂	42.8	31.2	15.2	8.4	34.0	7.0	31.8	30.0	11.6	10.0	7.6
California:													
Tulare	30699	♀	43.6	36.0	15.0	8.6	35.6	6.4	33.0	31.6	13.0	11.0	8.4
Do	30704	♀	42.0	33.6	14.0	8.2	33.4	6.0	31.8	30.2	12.4	10.4	8.0
Do	30705	♀	44.0	34.4	15.2	8.0	35.6	6.2	31.0	30.0	12.4	10.4	7.4
Do	30706	♂	44.8	33.0	15.0	8.4	34.4	6.0	32.2	31.0	13.4	12.4	8.4
Do	30707	♀	44.4	34.2	15.0	7.6	34.6	6.4	32.0	30.2	13.2	11.8	8.8
Do	30709	♀	44.0	34.0	15.4	8.2	34.4	6.2	32.4	30.0	13.2	11.2	8.2
Do	30714	♀	43.8	35.4	15.0	8.8	34.6	6.0	32.6	31.2	13.4	12.0	8.0
Do	30716	♀	43.0	36.4	14.6	8.8	34.4	7.0	31.8	30.2	12.0	11.0	7.8
Do	30721	♀	41.4	35.0	16.0	8.0	35.0	6.8	31.2	30.4	13.0	11.6	7.4
Do	30726	♀	41.2	34.6	15.0	7.0	34.0	6.0	31.2	29.8	13.0	11.2	8.0
Old Fort Tejon	29820	♀	43.0	33.8	14.8	8.4	36.0	6.0	34.0	31.8	12.2	10.4	8.2
Do	29826	♀	42.4	35.8	15.2	8.4	36.0	6.0	33.4	32.0	12.0	10.4	8.4
Do	29830	♀	38.0	28.0	15.0	8.0	33.0	6.2	32.0	30.0	12.0	10.4	8.2
Do	29848	♀	44.0	33.0	15.0	7.4	35.0	6.0	33.2	31.0	12.4	10.0	7.6
Do	29850	♀	41.4	34.0	15.4	9.0	34.8	6.2	33.2	32.0	12.2	9.8	8.0
Do	29852	♀	39.4	35.0	14.4	8.2	34.0	6.4	32.0	31.0	13.0	10.8	8.0
Do	29853	♀	46.2	39.8	15.4	8.4	35.0	6.0	32.2	31.0	14.0	11.0	9.0
Do	29855	♀	43.0	36.0	16.0	8.0	35.0	6.2	32.0	29.6	12.4	10.8	7.8
Do	[1] 5158 U.C.	♀	38.0	36.0	16.0	9.0	33.7	-----	-----	-----	-----	-----	---
Myotis yumanensis saturatus													
California:													
Menlo Park	142544	♂	43.0	32.6	15.2	8.4	34.4	6.8	32.0	30.2	14.0	13.0	8.0
Nicasio	60458	♀	43.8	35.4	15.4	8.4	34.4	6.2	31.8	31.0	12.4	10.0	9.0
Do	60469	♂	43.4	34.4	14.6	7.4	34.0	5.8	31.0	29.8	12.4	10.0	8.0
Oregon:													
Roseburg	24223	♂	41.4	34.0	15.2	8.4	34.4	5.4	33.2	30.6	13.0	9.6	8.0
Twelve Mile Creek	79308	♀	42.8	36.2	16.2	7.2	35.8	6.2	32.6	31.0	13.2	11.0	8 0
Crooked River	79305	♂	40.0	32.2	----	9.0	35.0	6.0	33.4	31.4	13.0	11.0	8.0
Washington:													
Goldendale	92628	♀	40.2	33.2	15.0	7.8	34.4	5.8	31.2	30.0	12.4	11.2	8.6
Do	92631	♀	42.4	35.0	16.0	8.2	34.0	6.0	31.4	30.0	13.0	10.8	8.4
Hamilton	[2] 24306	♂	"47"	"30"	15.0	8.6	33.0	5.0	-----	-----	-----	-----	----
Mabton	92624	♀	43.2	33.4	14.8	8.0	35.8	5.4	32.0	31.0	12.6	11.0	8.6
Neah Bay	91422	♂	39.0	31.6	15.4	7.0	33.0	6.6	30.4	29.2	12.2	11.0	7.6
Yakima	92623	♂	43.4	36.0	15.0	8.8	36.0	6.8	32.0	31.0	14.4	11.0	8.6
Myotis yumanensis lutosus													
Zacatecas: Hda. San Juan Capistrano	92384	♂	37.8	28.0	13.0	8.2	32.0	6.2	28.6	27.0	12.0	11.8	8.2
San Luis Potosi:													
Ahualulco	52324	♂	41.0	33.4	15.0	7.0	34.0	6.0	31.8	29.6	12.0	11.0	8.2
Do	52325	♂	39.4	36.4	14.8	7.4	34.6	6.2	31.6	29.8	12.0	11.0	8.2
Do	52326	♂	45.0	35.0	14.4	8.0	34.2	6.4	32.0	30.0	13.6	10.2	8.0
Do	52327	♀	42.0	37.4	14.4	7.8	34.4	6.0	32.0	30.2	14.0	10.6	8.4
Do	52328	♀	42.0	36.0	15.0	8.6	36.0	7.0	32.8	31.4	13.0	10.4	8.0
Do	52329	♀	44.0	37.0	14.8	8.0	35.0	6.2	32.4	31.0	12.4	9.6	8.0
Do	52330	♀	46.8	35.0	14.0	7.0	34.2	6.4	32.0	30.2	13.0	11.0	8.2
Do	52331	♀	41.4	35.0	14.6	8.0	35.4	6.0	32.8	31.6	13.4	11.0	8.0
Do	52332	♀	37.8	35.4	14.0	7.0	34.6	6.0	31.8	29.8	12.6	9.6	8.0
Do	52255	♂	43.0	37.6	14.4	8.8	34.6	6.4	32.6	31.0	14.6	12.0	7.8
Jalisco	72.10.7.3 B. M.	♂	43.6	32.2	13.4	8.2	32.4	7.0	30.0	29.0	14.0	12.0	8.4
Do	72.10.7.4 B. M.	♂	42.0	34.0	15.0	8.8	35.2	6.6	32.0	31.0	13.8	12.4	8.0
Michoacan:													
Patzcuaro	52176	♀	44.8	34.0	14.8	8.6	34.4	6.2	32.8	31.2	13.2	11.2	8.8
Do	52233	♂	42.8	33.6	15.4	8.2	35.0	6.0	32.0	30.8	12.4	10.2	8.2
Do	52262	♂	43.4	33.2	15.0	8.0	34.8	6.0	31.4	30.2	13.4	10.0	8.2
Do	52263	♀	41.2	33.0	14.0	8.0	33.8	6.8	30.8	29.8	13.2	11.2	9.0
Do	[2] 50783	♀	"49"	"36"	15.0	8.0	33.4	6.2	31.2	30.0	-----	-----	---

[1] Type; from H. W. Grinnell, 1918.

[2] Type.

Cranial measurements of Myotis yumanensis

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m³	Mandibular tooth row	Wear of teeth
Myotis yumanensis yumanensis													
Nevada:													
Pyramid Lake	244629	♀	14.0	13.2	8.6	3.6	7.0	5.0	10.0	5.0	5.6	5.6	1
Do	244633	♀	14.0	13.2	-----	3.6	7.0	5.0	9.8	5.2	5.6	5.4	1
Do	244634	♀	13.6	12.8	8.6	3.8	7.2	5.2	10.0	5.0	5.6	5.4	0
Do	244635	♀	13.8	13.0	8.8	3.8	7.2	5.0	9.8	5.2	5.6	5.2	1
Do	244636	♀	14.0	13.2	-----	3.8	6.8	5.0	9.8	5.0	5.6	5.6	0
Do	244637	♀	13.8	12.8	8.2	3.6	7.0	5.0	10.0	5.0	5.4	5.6	0
Do	244642	♀	13.6	13.0	-----	3.8	7.2	5.0	9.8	5.0	5.4	5.4	1
Do	244644	♀	14.0	13.0	8.2	3.8	7.2	5.0	9.8	5.0	5.4	5.6	0
Do	244645	♀	13.6	12.6	8.0	3.8	7.0	5.0	9.6	5.0	5.4	5.2	1
Do	244646	♀	13.8	12.6	8.2	3.8	7.0	5.2	9.8	5.0	5.6	5.4	1
Do	244647	♀	14.0	13.2	8.0	3.6	7.0	5.0	9.8	5.0	5.4	5.6	0
Do	244648	♀	14.0	13.0	8.6	3.8	7.0	5.0	10.0	5.0	5.4	5.4	0
Do	244649	♀	13.6	12.8	-----	3.6	7.0	5.0	9.6	5.0	5.4	5.4	0
California:													
Fort Yuma	60357	♀	13.7	12.6	8.0	4.0	6.8	5.0	9.8	5.0	5.6	5.4	1
Do	60358	♀	13.7	13.0	8.0	4.6	7.0	5.0	9.8	5.2	5.5	5.6	1
Do	60360	♀	-----	13.0	8.6	4.8	7.2	5.0	10.0	5.0	5.4	5.6	1
Potholes	28774 U. C.	♀	13.7	12.8	8.5	3.5	7.2	5.2	9.7	5.0	5.6	5.3	1
Arizona:													
Fort Mohave	171508	♀	13.9	12.8	8.0	4.2	7.0	5.0	9.8	5.2	5.5	5.6	1
Tucson	22494	----	13.6	12.6	8.4	3.6	7.0	5.0	9.6	5.2	5.4	5.4	1
Texas:													
Del Rio	127231	♀	13.6	12.6	-----	4.2	7.0	4.8	9.6	5.0	5.2	5.4	1
Do	127233	♀	13.8	12.8	8.2	4.6	6.8	4.8	9.4	5.2	5.3	5.4	1
Marathon	108581	♂	13.4	12.6	8.0	4.4	6.8	4.6	9.6	5.0	5.2	5.2	1
Lower California	[1] 38357	♂	13.9	12.8	-----	4.4	7.2	5.0	9.8	5.0	5.0	5.4	0
San Pedro Martir Mountains	138554	♀	-----	-----	-----	3.6	7.2	-----	9.4	5.2	5.2	5.2	0
Do	138559	♀	13.6	12.6	-----	3.8	7.2	5.0	9.6	5.2	5.4	5.4	1
Myotis yumanensis sociabilis													
Montana:													
Corvallis	160187	♂	13.8	13.0	-----	3.6	7.0	4.6	9.6	5.0	5.6	5.6	0
Do	160189	♂	13.6	12.6	8.2	3.6	7.0	5.0	-----	5.2	5.6	5.6	0
Do	160181	♀	14.0	13.2	8.4	3.8	7.2	5.4	10.0	5.2	5.8	5.6	3
Do	160183	♀	14.0	13.2	8.4	3.6	7.2	5.2	9.8	5.2	5.4	5.6	0
Do	160184	♀	13.8	13.0	-----	3.6	7.0	5.0	10.0	5.2	5.6	5.4	2
Do	160186	♀	13.8	13.0	8.4	3.6	6.8	5.0	10.0	5.0	5.6	5.6	0
Do	168835	♀	14.0	13.0	8.2	3.6	7.0	5.0	10.0	5.2	5.6	5.6	0
Do	168836	♀	13.8	12.8	-----	3.8	7.0	5.0	-----	5.2	5.6	-----	0
Do	168837	♀	14.0	13.0	8.0	3.6	7.0	5.0	10.0	5.2	5.6	5.6	0
Do	168838	♀	13.8	13.0	8.2	3.8	7.0	5.0	10.0	5.2	5.6	5.4	1
Do	168839	♀	14.0	13.0	8.4	3.6	6.8	4.8	9.8	5.2	5.6	5.6	0
Do	168840	♀	13.8	13.0	8.2	3.6	7.0	5.0	9.8	5.2	5.6	5.6	1
Oregon:													
Klamath Falls	25381 U.C.	♀	14.1	13.2	8.5	3.6	7.0	5.2	10.0	5.1	5.3	5.5	0
Do	1873954 U.S.N.M.	♀	14.0	12.3	-----	3.8	7.0	5.0	-----	5.0	5.3	5.4	1
California:													
Fort Tejon	13296 F.M.	♀	14.0	13.0	8.4	3.8	7.0	5.0	9.4	5.0	5.3	5.4	3
Do	5149 U.C.	♀	13.9	12.8	8.2	3.8	7.0	5.2	9.6	5.0	5.4	5.4	1
Do	[2] 5158 U.C.	♀	14.2	13.3	8.4	3.6	7.2	5.0	10.0	5.2	5.6	5.6	2
Do	6643 U.C.	♀	14.0	13.0	8.1	3.5	6.9	5.1	9.8	5.2	5.3	5.4	0
Do	6657 U.C.	♀	13.9	13.0	8.4	3.7	6.8	5.0	9.9	5.1	5.4	5.4	0
Do	6660 U.C.	♀	14.0	13.0	8.4	3.8	7.0	5.0	9.8	5.0	5.4	5.3	0
Myotis yumanensis saturatus													
Washington:													
Hamilton	[2] 24306	♂	-----	13.0	8.2	4.2	7.2	5.2	10.0	5.0	-----	5.4	2
Husum	230149	♂	13.8	12.8	8.4	3.6	7.0	5.0	9.2	5.0	5.6	5.4	1
Quinault Lake	242386	♂	13.8	12.8	8.2	3.6	7.2	5.0	9.6	5.0	5.4	5.4	0
Do	242387	♂	13.8	12.8	-----	3.8	7.4	5.2	9.2	5.0	5.4	5.4	1
Stevenson	230151	♂	13.4	12.6	8.0	3.6	7.0	4.8	10.0	5.0	5.4	5.2	0
Roy	90493	♀	13.8	13.0	8.3	3.8	7.2	5.0	9.8	5.0	5.5	5.4	0
Do	90494	♀	13.6	13.0	-----	3.8	7.0	5.0	9.8	5.0	5.2	5.4	0
Lake Cushman	66223	♀	13.6	12.4	8.4	4.4	7.0	5.0	-----	4.8	5.5	-----	1
Lake Washington	90758	♂	13.8	13.0	8.2	3.8	6.8	5.0	9.8	5.0	5.3	5.5	0

[1] Type of *Vespertilio obscurus* H. Allen.

[2] Type.

Cranial measurements of Myotis yumanensis—Continued

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis yumanensis saturatus—Continued													
British Columbia:													
Okanagan	12.11.22.1 B. M.	♀	13.8	12.8	8.2	4.0	7.2	5.2	9.6	5.0	5.3	5.2	1
Chilliwack	7215 F.M.	♂	13.7	12.6	-----	3.6	7.0	5.0	9.6	5.0	5.3	5.2	1
Oregon:													
Wedderburn	166977	♀	13.6	12.4	7.8	3.4	6.8	5.0	9.2	4.8	5.4	5.4	0
Wilson River	88987	♂	13.6	12.8	-----	3.7	7.0	4.8	9.8	5.0	-----	5.4	0
McKenzie Bridge	204382	♂	14.0	13.2	8.8	3.6	7.0	5.0	10.0	5.2	5.4	5.4	0
Do	204384	♀	13.8	13.0	-----	3.6	6.8	5.0	10.0	5.0	5.4	5.4	0
Myotis yumanensis lutosus													
Michoacan:													
Patzcuaro	50782	♀	13.9	12.4	8.0	3.8	6.9	5.0	9.8	5.0	5.2	5.3	0
Do	[1] 50783	♀	13.8	12.8	8.0	3.7	6.8	5.0	10.0	5.1	5.1	5.4	0
Zacatecas: San Juan Capistrano	90928	♂	13.0	12.0	8.0	3.6	6.6	4.8	9.2	4.6	5.0	5.0	1

[1] Type.

MYOTIS AUSTRORIPARIUS (Rhoads)

Vespertilio gryphus Rhoads, Proc. Acad. Nat. Sci. Philadelphia, p. 157, May 22, 1897.

Vespertilio lucifugus austroriparius Rhoads, Proc. Acad. Nat. Sci. Philadelphia, p. 227, May 1897.—Miller, North Amer. Fauna, No. 13, p. 21, October 16, 1897.—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 308, December 30, 1901.

Myotis lucifugus Miller, North Amer. Fauna, No. 13, pp. 60, 63, October 16, 1897 (part).

Myotis lucifugus austroriparius Trouessart, Catal. Mann. viv. foss., suppl., p. 92, 1904.

Myotis subulatus Hahn, Biol. Bull., vol. 15, p. 139, August, 1908 (part, not *Vespertilio subulatus* Say); The Mamm. of Indiana, 33d Ann. Rep. Dept. Geol. and Nat. Resources of Indiana, 1908, p. 623, 1909 (part).

Type locality.—Tarpon Springs, Pinellas County, Fla.

Type specimen.—Skin and skull of immature female in the collection of the Academy of Natural Sciences of Philadelphia (formerly No. 878 Rhoads collection). Taken at Tarpon Springs, Fla., June 23, 1892, by W. S. Dickinson.

Distribution.—Vicinity of Tarpon Springs, Fla.; Mitchell, Ind.; Canada?

Diagnosis.—Externally like *Myotis lucifugus* except that the fur of the back is shorter and more dense, and the dark bases and burnished tips of the hairs are both less conspicuous; color a dull yellowish or drabby brown. Skull differing from that of all the known races of *M. lucifugus* in its more slender general form, narrower interorbital constriction, narrower brain case, and in the constant presence (in adults) of a low but perfectly formed sagittal crest.

External characters.—The external characters as shown by a series of 12 skins from Florida and four from Indiana do not differ appreciably from those of *Myotis lucifugus lucifugus* otherwise than in the short, dense, woolly quality of the fur, and the dull coloration of the dorsal surface. Hairs at middle of back, in fresh pelage, usually about 6 to 7 mm. in length instead of 9 to 10 mm. In some individuals there appears to be tendency for the wing membrane to be inserted at or near the ankle, but this may be due to a peculiarity in the make-up of the skins.

Fur and color.—The fur of this species is distinctive by reason of its thick, woolly appearance, resulting from the fine and rather uniform texture without a conspicuous over fur. This quality of the fur, together with the lack of long burnished tips to the hairs of the back as well as the absence of strong contrast in color between the tips and the bases of the hairs, serves to distinguish the animal readily from *M. lucifugus* which it otherwise somewhat resembles. The actual elements of the color are essentially the same as in *Myotis lucifugus lucifugus*, but the shortness and inconspicuousness of the burnished hair tips on the upperparts give a noticeable dull and lusterless effect usually ranging in tint from sudan brown to Saccardo's umber (Ridgway, 1912). On parting the hairs the plumbeous basal area of the fur is seen to be less extensive and less dark than in *M. lucifugus.* In some individuals the back has a peculiar drabby cast which we have never seen in *M. lucifugus.* Underparts dull buff, much as in *M. l. lucifugus* but the palest individual paler than usual in the related animal.

Skull.—The skull is more slender throughout than that of *Myotis lucifugus.* While this character is most obvious in the interorbital region (interorbital breadth in 16 skulls varying from 3.6 to 4.0 as against 4.0 to 4.4 in 60 skulls of true *M. lucifugus*) it can also be appreciated on direct comparison of the breadth of the rostrum over bases of canines, as well as of the lacrymal breadth and the breadth of brain case. A low but perfectly definite and sharp-edged sagittal crest is present in all of the adult specimens examined, this character alone being sufficient to distinguish the series from any similar series of *Myotis lucifugus.* The crest resembles that present in the otherwise very different species, *M. velifer* and *M. grisescens.* When the brain case is viewed from behind, side by side with specimens of *M. lucifugus* from the eastern United States, the narrower, relatively higher form in *Myotis austroriparius* is at once evident. In this view the summit of the arch in *M. lucifugus* is nearly always obviously flattened, while in *M. austroriparius* it is distinctly convex. When the skull is seen from below its general narrowness is evident but there appear to be no structural peculiarities to distinguish it from the skull of *M. lucifugus lucifugus*.

Teeth.—The teeth are about the same size as those of *Myotis lucifugus lucifugus*, therefore smaller than those of *M. grisescens* and *M. velifer*. In structure they show no very obvious peculiarities. The upper molars have the full complement of secondary cusps and ridges, and the cingulum on the inner margin of their crowns is almost invariably as much developed as in the maximum condition seen in *Myotis lucifugus* (2 exceptions among 16 specimens), a character usually shared by *M. grisescens* and less frequently by *M. velifer*. The two upper small premolars are very slightly crowded, the anterior with the transverse axis of its crown perceptibly greater than the longitudinal axis. The anterior tooth is about twice the height of the posterior. The lower canine is relatively short and stout, hardly exceeding the third premolar. The two small anterior lower premolars are fully in the tooth row, the posterior tooth only slightly exceeded in height and cross section by the anterior.

Measurements.—For measurements see tables, page 80.

Specimens examined.—Twenty-three from the following localities:

?CANADA: 1 skin (B.M.).
FLORIDA: Tarpon Springs, Pinellas County, 2 skins including type, 4 alc. (A.N.S.P.); Bird Key, Tampa Bay, Pinellas County, 12 skins (Copeland).
INDIANA: Mitchell, 4 skins (U.S.N.M.).

Remarks.—*Myotis austroriparius* bears a general resemblance to several of the brownish species occurring in eastern North America, but may be distinguished by its large and strong hind foot without keel on the calcar, and by its thick, almost wooly fur of a dull cinnamon or drab tint. In the drab pelage it somewhat resembles the slightly larger *Myotis grisescens*, but in this species there is no obvious basal darkening of the hairs of the back, and the origin of the wing membrane is from the ankle instead of from the metatarsals near the base of toes. From *M. lucifugus*, with which it is doubtless often associated, it is distinguished by the lack of noticeable burnished tips to the hairs, and by the uniform presence of a distinct sagittal crest on the skull. From *Myotis velifer*, a species with similarly dull unburnished fur, it differs in smaller size, narrow, weak rostrum, and the normal (not enlarged) cheek teeth. From *Myotis keenii septentrionalis* it is distinguished by its larger feet, less elongate ears, and crested skull.

Although the species was described thirty years ago, its true characters are now for the first time recognized. The first specimens recorded (Rhoads, 1894) were collected by Mr. W. S. Dickinson in 1892 at Tarpon Springs, Florida, and were identified by Harrison Allen as *Vespertilio gryphus* (=*Myotis lucifugus*). Three years later Rhoads, noticing that its dense, lusterless, dull-colored fur was unlike that of northern *Myotis lucifugus*, separated the Florida animal as a subspecies, under the name *austroriparius*.

He then submitted his material to Miller who saw that the two skins, one of them the type, pertained to immature individuals and that the specimens in alcohol did not differ appreciably, except in their short fur and dull color, from true *M. lucifugus*. Believing that the pecularities of the series were all due to immaturity and the effects of alcohol Miller placed Rhoads' name in the synonymy of *lucifugus*, where it has remained until now. The animal was next collected by Hahn in Indiana, but was confused by him with *Myotis* "*subulatus*" (=*M. keenii septentrionalis*). This error was detected by Allen while examining Hahn's material, now in the United States National Museum, during the preparation of this monograph. The characters, when once seen, were so obvious that we unhesitatingly drew up a description of Hahn's bat as a new species. It remained thus until the manuscript was nearly ready to go to press, when, fortunately, Mr. Copeland sent us his series of twelve skins of adults from Bird Key, Tampa Bay, south of Tarpon Springs. Study of this material soon showed two things: that the *austroriparius* of Rhoads was specifically distinct from *Myotis lucifugus*, and that the animal was identical with the bat subsequently taken in Indiana by Hahn.

When he placed the name *austroriparius* in the synonymy of *Myotis lucifugus* Miller called attention to the likelihood that LeConte's animal might prove to be the same as the one described by Rhoads, should the latter ever be shown to possess distinctive characters.[10] This possibility has not yet been disposed of, as we still have no knowledge as to the forms of *Myotis* actually occurring in southern Georgia. It may be said, however, that LeConte has written nothing in either of his descriptions of *Vespertilio lucifugus* which points toward the present animal, and also that the only known specimen that can be reasonably supposed to have been determined by LeConte (see p. 44) is a typical example of *Myotis lucifugus lucifugus* as now understood.

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[10] North Amer. Fauna, No. 13, p. 21, October 16, 1897.

External measurements of Myotis austroriparius

Locality	Number	Sex	Head and body	Tall	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus
Florida:											
Bird Key (Pinella County)	806 Copeland	♀	50.5	38.5	15.6	9.4	38.0	6.0	36.0	34.2	------
Do	808	♂	51.5	36.5	16.0	9.8	37.4	5.8	35.6	33.6	------
Do	810	♀	53.0	35.0	16.2	9.2	39.0	6.2	35.2	35.0	14.0
Do	811	♀	51.0	38.0	16.6	9.4	38.4	7.0	35.6	33.6	13.0
Do	812	♀	51.5	35.5	16.8	9.0	40.4	6.4	36.8	35.0	12.4
Do	813	♀	53.0	37.0	17.0	9.6	39.6	6.4	36.4	35.0	14.0
Do	814	♀	52.5	36.5	16.0	9.0	40.0	6.0	37.6	36.2	13.0
Do	817	♂	51.0	37.0	16.0	8.6	38.2	6.0	35.2	34.0	13.0
Do	824	♂	45.5	36.5	16.0	8.4	38.4	5.6	36.0	33.6	12.2
Do	825	♂	49.5	38.0	16.2	9.6	38.6	6.0	35.8	34.2	13.4
Do	827	♀	51.0	32.0	16.2	8.4	37.0	6.2	34.0	32.8	12.0
Do	826	♂	49.0	36.5	15.0	8.8	36.2	5.8	33.2	31.6	12.8
Indiana:											
Mitchell	153635	♂	51.0	34.0	15.2	10.0	40.2	6.2	33.2	35.0	------
Do	153638	♂	51.0	38.0	16.8	9.0	37.6	6.6	34.6	33.4	------
Do	153639	♂	52.0	36.0	17.0	9.8	39.4	6.4	36.2	34.2	------
Do	153630	♀	51.0	36.0	15.4	9.8	39.8	7.2	36.2	35.8	------
Canada (?)	37.4.8.127 B.M.	----	53.0	32.4	16.8	9.2	38.8	6.8	35.4	33.2	------

Cranial measurements of Myotis austroriparius

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Florida:													
Bird Key	808 Copeland	♂	14.4	13.6	8.8	3.8	7.0	5.2	10.0	5.2	5.6	5.4	1
Do	817	♂	14.2	13.6	9.2	3.6	7.2	5.0	10.4	5.4	5.8	5.6	1
Do	824	♂	14.2	13.4	-----	4.0	7.2	5.0	10.0	5.0	5.6	5.6	0
Do	825	♂	14.4	13.8	9.0	3.6	7.0	5.0	10.0	5.2	5.6	5.8	0
Do	826	♂	14.4	13.8	9.0	3.6	7.2	5.2	10.2	5.4	5.6	5.6	0
Do	806	♀	14.2	13.6	-----	3.4	7.0	5.0	10.0	5.2	5.6	5.8	0
Do	810	♀	14.2	13.8	-----	3.6	7.2	5.2	10.6	5.4	5.8	6.0	3
Do	811	♀	14.2	13.6	9.2	3.8	7.0	5.2	10.0	5.2	5.6	6.0	1
Do	812	♀	14.6	13.8	-----	3.6	7.0	5.0	10.4	5.2	5.6	6.2	0
Do	813	♀	14.8	13.8	9.0	3.8	7.2	5.4	10.2	5.2	6.6	5.8	0
Do	814	♀	14.8	13.6	-----	3.6	7.2	5.2	10.4	5.4	5.8	5.8	1
Do	827	♀	14.4	13.2	9.0	3.6	7.2	5.4	10.0	5.2	5.6	5.6	1
Indiana:													
Mitchell	153635	♂	14.6	13.8	9.0	3.8	7.4	5.8	-----	5.4	5.8	-----	3
Do	153638	♂	14.8	14.0	-----	3.6	7.2	5.6	11.0	5.6	6.0	6.0	0
Do	153639	♂	14.8	14.0	9.0	3.8	7.2	5.4	-----	5.4	5.8	-----	0
Do	153630	♀	15.0	14.0	-----	3.8	7.6	6.0	10.6	5.6	5.8	6.0	2

MYOTIS GRISESCENS A. H. Howell

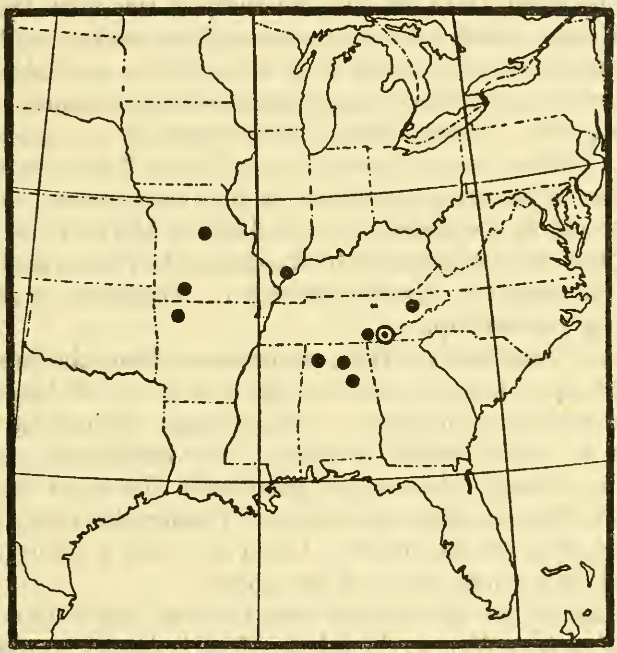
Vespertilio gryphus lucifugus H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 80, March 14, 1894 (part; M. C. Z. specimen from Arkansas).

Myotis velifer Miller, North Amer. Fauna, No. 13, p. 59, October 16, 1897 (part; specimens from Marble Cave, Missouri).—Hahn, Proc. U. S. Nat. Mus., vol. 35, p. 580, December 7, 1908 (part; Indiana).—Bailey, North Amer. Fauna, No. 25, p. 208, October 24, 1905 (part; Marble Cave, Missouri).

Myotis grisescens A. H. Howell, Proc. Biol. Soc. Washington, vol. 22, p. 46, March 10, 1909.—Hahn, The Mamm. of Indiana, 33d Ann. Rep. Dept. Geol. and Nat. Resources of Indiana, 1908, p. 625, 1909.—Cory, Mamm. Illinois and Wisconsin, Field Mus. Nat. Hist., publ. 153, zool. ser., vol. 11, p. 459, fig. (head), 1912.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 54, December 31, 1912.—A. H. HOWELL, North Amer. Fauna, No. 45, p. 23, October 28, 1921.—ELLIOT, Check List Mammals North Amer., suppl., p. 154, 1917.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 67, April 29, 1924.

Type locality.—Nickajack Cave, Marion County, Tenn.

Type.—Adult male, skin and skull, No. 157517 United States National Museum (Biological Survey Collection), collected in Nickajack Cave, near Shellmound, Marion County, Tenn., August 31, 1903, by A. H. Howell.



MAP 3.—DISTRIBUTION OF MYOTIS GRISESCENS

Distribution.—Limestone area from extreme southern Indiana and Illinois south to Tennessee, Georgia, and central Alabama, westward to southwestern Missouri and northern Arkansas.

The range is still imperfectly known, but, as indicated by specimens now at hand, it apparently does not meet that of *Myotis velifer incautus* at any point, nor does it extend east of the Alleghenies. The occurrence of this animal in Kentucky can hardly be doubted, though no specimens are available. This distribution is probably conditioned in part by the presence of large limestone caves available for permanent habitation, and the occurrence of the caves is in turn dependent on the geological structure of the country. For unlike most other cave-haunting *Myotis*, of eastern North America at least, this species frequents these caverns regularly in summer, as well as during the hibernation period, so that the *grisescens* population is more concentrated than in the case of those species (as *M. lucifugus*, *M. keenii septentrionalis*) that largely desert the caves in summer. Howell (1909, 1921) has given a brief account of these Tennessee caves and their bat population.

Diagnosis.—Size decidedly greater than in *Myotis lucifugus*, but general proportions not strikingly different (ratio of tail to head and body in 10 topotypes, 76.4); forearm usually more than 40 mm.; greatest length of skull ranging from 15.5 to 16.5 mm., maxillary tooth row ranging from 5.8 to 6.2 mm., lower tooth row more than 6 mm. (6.2 to 6.6 mm.); skull with an obvious sagittal crest in adults; cheek teeth proportioned to the palate as in *M. lucifugus*, not enlarged as in *M. velifer;* first and second upper molars with protoconule unusually well developed; a broad, conspicuous cingulum on inner margin of crown. Differs from all other known North American species in the insertion of the wing membrane at the tarsus instead of the side of the foot and in the absence of dark bases to the hairs of the back.

Ears.—The ears are about as in *Myotis velifer:* when laid forward reaching the nostril or slightly beyond it. Tragus as in *M. velifer*, with bluntly pointed tip.

Wing and membranes.—Wing membranes from the base of the tarsus instead of from the base of the toes as in all known North American species, a character which, though obvious in alcoholic specimens, is often obscure in skins if the membrane is stretched laterally in drying. Metacarpals graduated, the third longest, the fourth and fifth successively shorter. Taking the third finger as 100, the fourth is 86, the fifth 80. When the wing is folded the third metacarpal falls 4 mm. short of the elbow.

Foot.—Except for their larger size the foot and calcar resemble those of *Myotis lucifugus*, though the foot is longer proportionally to the tibia. In 10 topotypes the ratio of foot to tibia averages 60.1; in 10 specimens from Illinois it averages 58.8.

Fur and color.—The fur is more velvety than in *Myotis lucifugus*, and the hairs of the dorsal surface are strikingly characterized by being of essentially the same tint throughout instead of conspicuously darker at the base. There are two color phases: dusky and russet. The former is represented by the series of 20 skins from the type locality, Nickajack Cave. These average darker than the other available specimens, and are a uniform smoky (about "chætura drab") above to the roots of the hairs; below paler, the hairs "dark mouse gray" at their bases with dull whitish tips, those of the chin lighter, and those between the thighs whitish throughout.

Specimens from Indian Cave, Tenn., and from Rosiclare, Ill., are of a slightly warmer tint. In a series of 12 skins from Rogersville, Ala. (U.S.N.M.), both phases are represented by adults: The dusky as above described; and the russet, a nearly uniform "cinnamon-brown" above to the roots of the hairs, the lower surfaces with the whitish tips replaced by a pale buff, contrasting with the darker bases of the hairs.

Skull.—The skull differs from that of *Myotis lucifugus* in its larger size. In shape and proportions the crania of the two species are practically alike, but the evident sagittal and lambdoid crests make the skull of *Myotis grisescens* readily distinguishable.

Teeth.—The two small upper premolars stand nearly in the tooth row so that both are clearly visible in side view, while from below, a line connecting the posterior angle of the canine and the anterior corner of the large p^4 passes through the outer part of both the other premolars. In m^1 and m^2 the protoconule is unusually well developed, but in actual structure the small cusps and their accompanying ridges do not differ from those which occur in *Myotis lucifugus.* Cingulum on inner side of crown in m^1 and m^2 well developed and conspicuous, but apparently never extending around the antero-lingual base of the protocone. At the postero-lingual base of the hypocone the cingulum frequently becomes so thickened as to resemble a low cusplike tubercle applied to the base of the hypocone. This tubercle may in rare instances (No. 202022, U.S.N.M.) become so large that it bears at its summit a distinctly worn area produced in m^2 by the protoconid of m_3 and in m^1 by the protoconid of m_2. The teeth of the lower jaw show no special characteristics.

Measurements.—For measurements see tables, pages 84 and 85.

Specimens examined.—Total number 258, from the following localities:

ALABAMA: Anniston, Calhoun County, 2 alc. (M. C. Z.); Fort Deposit, Marshall County, 10 skins, 8 alc. (U.S.N.M.); Rogersville, Lauderdale County, 12 skins, 49 alc. (U.S.N.M.).

ARKANSAS: [? Osage River], 1 alc. (M. C. Z.).

ILLINOIS: Rosiclare, Hardin County, 12 skins, 33 alc. (F. M.).

MISSOURI: Columbus, 1 alc. (U.S.N.M.); Marble Cave, Stone County, 12 skins, 3 alc. (U.S.N.M.).

TENNESSEE: Indian Cave, Grainger County, 13 skins (Univ. Wisconsin), 15 alc. (U.S.N.M.), 1 skin (M. C. Z.); New Market, Grainger County, 1 skin (M. C. Z.); Nickajack Cave, Marion County, 21 skins, 62 alc. (U.S.N.M.), 1 alc. (A. N. S. P.); Shell Mound, 1 alc. (U.S.N.M.).

Habits.—An interesting point in connection with the fact that colonies of *Myotis grisescens* frequent the same caves in both summer and winter is the segregation of the sexes at certain times of year. The breeding females seem to congregate apart from the males. The young are probably born in early July, and when these are well grown a breeding colony naturally contains the adult females as well as immature bats of both sexes. But in August, the colonies seem to contain adult males as well as adult females. Thus of 21 bats from Nickajack Cave, Tenn., August 31, 15 were adult males, 6 adult females; and of 9 from Rosiclare, Ill., August 14, 4 were adult males, 5 adult females. Presumably pairing takes place in the fall, after which the sexes probably segregate until the following August. At all events, 17 specimens taken April 14 at Indian Cave, Tenn., were all females. Again, a series of 18 from Fort Deposit, Ala., June 18–19, proved to be all males, while of 12 adults taken a little later, July 9, at Rogersville, Ala., all but 1 were females.

Remarks.—Superficially *Myotis grisescens* resembles *M. velifer* in its large size and dull fur. It is, however, a very distinct animal. Apparently is has no near relatives, the insertion of the wing membrane at the ankle joint and the peculiar color pattern of the hairs on the back distinguishing it sharply from all known American species.

Abnormalities in the number or position of the two minute upper premolars are interesting as indicating the evolutionary tendency in connection with the reduction of the tooth row. Thus in 16067 (Field Museum) from Rosiclare, Ill., these two teeth are so placed that instead of standing in the tooth row, the smaller (p^3) on each side is drawn inward while the anterior tooth practically fills the entire space between the canine and p^4 so that the smaller tooth is hardly visible in side view.

Specimens of *Myotis grisescens* were collected in late June 1892, at Marble Cave, Mo., by Vernon Bailey, and were referred by Miller (1897) to *Myotis velifer*. Of three individuals taken, "one was caught in the cave 150 feet below the surface of the earth; the others were shot as they came out of the mouth of the cave in the evening" (Bailey, 1905). The true characters of the animal were detected by Howell, in the series of specimens which he secured in Nickajack Cave on August 31, 1908.

External measurements of Myotis grisescens

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Illinois:													
Rosiclare	16082 F.M.	♀	51.8	43.2	15.6	10.0	44.0	8.4	41.0	38.4	15.2	12.0	8.4
Do	16083	♀	49.8	38.0	16.6	9.2	42.4	7.0	38.8	36.6	14.4	11.6	9.4
Do	16084	♀	49.6	41.8	17.8	9.6	43.4	8.0	39.8	37.6	14.4	12.0	9.0
Do	16074	♀	51.0	41.4	18.0	9.6	45.4	7.2	41.6	39.2	14.6	12.0	9.4
Do	16090	♀	52.0	40.0	17.0	9.4	43.4	7.4	40.0	38.6	14.2	12.0	9.0
Do	16097	♂	48.4	38.0	18.2	10.6	45.4	8.6	40.6	38.4	14.2	11.0	9.2
Do	16099	♂	52.8	37.8	17.4	9.2	43.6	7.4	39.6	37.4	13.8	12.0	9.6
Do	16101	♂	48.6	39.6	16.4	9.6	42.0	7.4	38.4	36.8	14.4	10.8	8.4
Do	16102	♂	51.4	33.0	17.8	10.2	43.2	8.4	40.0	37.8	13.8	10.4	9.0
Do	16103	♂	52.4	37.6	17.4	9.4	43.0	8.0	39.0	36.8	15.2	11.0	8.0
Missouri:													
Marble Cave	53023 U.S.N.M.	♂	51.0	35.4	17.2	9.6	42.4	8.4	40.4	38.4	14.2	12.0	10.0
Do	53024	♂	49.8	38.0	17.6	9.8	40.6	7.0	38.0	36.4	14.4	11.2	9.0
Do	52820	♂	53.0	35.6	18.0	10.0	43.8	7.4	40.0	38.0	14.4	11.4	9.0

External measurements of Myotis grisescens—Continued

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Tennessee:													
Nickajack Cave	[1] 157517	♂	"53"	"37"	18.6	11.2	43.0	8.0	39.8	37.4	-----	-----	---
Do	157711	♀	50.0	38.8	17.4	10.4	44.4	7.4	40.2	37.4	14.0	10.6	9.0
Do	157720	♀	48.6	38.6	16.8	10.2	42.8	7.4	38.0	36.6	13.0	10.8	8.4
Do	157725	♂	49.6	33.0	17.2	10.0	43.8	7.8	38.6	36.0	13.8	11.6	9.0
Do	157737	♂	48.2	38.8	17.6	9.8	43.2	8.0	39.8	37.2	14.0	11.4	8.4
Do	157738	♀	51.6	41.0	17.6	10.4	41.8	7.6	38.6	37.0	15.0	10.6	9.4
Do	157754	♀	50.8	38.0	16.2	11.0	42.8	8.4	38.6	37.2	14.8	12.4	9.0
Do	157757	♀	48.8	39.0	16.8	9.8	41.2	8.0	38.0	36.6	13.0	11.2	9.0
Do	157758	♂	47.4	32.8	16.0	11.0	40.8	8.0	37.0	35.0	14.0	10.6	8.6
Do	157760	♂	48.6	39.8	17.2	10.0	44.4	8.4	40.0	37.8	14.6	12.0	9.0
Do	157766	♂	50.4	38.0	17.0	9.4	43.4	8.0	39.8	38.0	14.0	12.0	8.0
Alabama:													
Fort Deposit	201645	♂	51.0	40.0	17.6	9.4	44.6	8.6	40.8	38.8	14.6	11.0	8.8
Do	201646	♂	49.0	38.0	17.8	10.0	44.0	8.0	40.2	39.0	14.0	11.8	10.0
Do	201650	♂	49.0	40.2	19.0	9.8	45.8	7.2	41.6	39.6	16.0	13.4	9.4
Do	201651	♂	47.6	37.4	16.4	9.6	42.4	8.2	38.0	35.4	14.0	11.0	8.6
Do	201652	♂	48.6	40.6	17.0	9.0	44.8	8.0	40.0	38.0	15.0	11.8	9.0
Rogersville	201907	♀	51.4	40.0	16.6	9.4	43.0	8.4	39.6	38.0	13.6	12.4	9.6
Do	201912	♀	48.0	37.8	16.2	10.0	43.4	8.0	39.8	37.8	14.0	10.0	8.0
Do	201913	♀	49.6	44.2	18.0	10.0	45.6	8.0	40.8	39.8	14.2	10.2	9.4
Do	201914	♀	51.8	39.2	17.6	10.2	43.8	7.2	39.4	37.0	13.4	11.0	8.2
Do	201917	♀	51.6	39.0	17.4	9.2	45.0	7.8	40.6	38.6	14.0	12.0	10.0
Do	201926	♀	49.0	40.6	18.4	10.8	43.0	8.4	40.0	38.0	13.0	11.4	8.4
Do	201927	♀	50.0	39.6	17.4	9.4	44.4	8.4	40.0	37.0	14.0	11.0	9.4
Do	201937	♂	45.4	35.0	17.6	8.4	43.4	7.4	40.0	37.4	13.6	11.6	9.0
Do	201938	♂	47.6	40.6	17.6	10.4	42.0	8.4	38.0	36.0	15.0	12.0	8.6
Do	201940	♂	48.6	38.0	17.0	9.0	43.0	7.0	39.0	36.6	13.0	11.0	8.2

[1] Type.

Cranial measurements of Myotis grisescens

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Illinois:													
Rosiclare, Hardin County	15830 F. M.	♂	16.1	15.0	-----	4.0	7.6	5.6	11.8	6.0	6.1	6.4	1
Do	16066	♂	16.4	15.0	10.0	4.0	8.0	6.0	11.6	6.0	6.3	6.4	3
Do	16067	♂	16.0	14.8	-----	4.0	7.8	5.6	11.2	6.0	6.3	6.2	1
Do	16068	♂	15.9	15.0	-----	4.0	7.8	5.8	11.6	6.0	6.3	6.2	1
Do	15831	♀	16.0	15.0	-----	4.0	7.8	6.0	11.2	5.8	6.2	6.2	2
Do	16064	♀	15.9	14.8	10.0	4.0	7.4	6.0	11.2	6.0	6.4	6.2	1
Do	16069	♀	16.0	14.8	10.0	4.0	8.0	5.8	11.4	6.0	6.3	6.2	1
Do	16072	♀	16.2	15.2	-----	4.0	7.6	5.8	11.8	6.0	6.3	6.4	2
Missouri: Marble Cave, Stone County	53024	♂	15.5	14.4	-----	3.8	7.4	5.4	11.2	6.0	6.3	6.2	0
Tennessee:													
Nickajack Cave, Marion County	[1] 157517	♂	16.0	15.0	10.0	4.0	7.8	5.8	11.6	6.0	6.3	6.2	2
Do	157516	♂	15.8	14.8	10.0	3.8	7.8	6.0	11.2	6.0	6.3	6.2	3
Do	157518	♂	15.9	14.6	10.0	4.0	7.8	5.8	11.0	6.0	6.3	6.2	3
Do	157519	♂	15.9	15.0	9.8	4.0	7.6	5.6	11.2	6.0	6.4	6.2	2
Do	157521	♂	15.7	14.8	10.0	4.0	7.4	6.0	11.0	6.0	6.5	6.2	2
Do	157523	♂	16.2	14.6	10.0	4.0	7.6	5.4	11.2	5.8	6.4	6.2	2
Do	157528	♂	16.0	15.2	10.0	4.0	8.0	6.0	11.6	6.0	6.3	6.4	3
Do	157532	♂	16.1	15.0	10.2	4.0	7.8	6.0	11.8	6.0	6.4	6.2	3
Do	157534	♂	15.9	14.8	-----	4.0	8.0	6.0	11.2	6.0	6.4	6.6	2
Do	157535	♂	15.8	14.6	10.0	4.0	7.6	5.8	11.0	6.0	6.2	6.4	0
Do	157524	♀	15.8	15.0	10.2	4.2	7.7	6.0	11.4	6.0	6.4	6.4	1
Do	157525	♀	15.8	15.0	10.0	3.8	7.6	6.0	11.6	6.0	6.5	6.4	3
Do	157531	♀	16.0	15.0	10.0	3.8	7.8	6.0	11.4	5.8	6.5	6.2	1
Do	157533	♀	16.3	15.0	10.0	4.2	7.8	6.0	11.8	6.0	6.5	6.2	2
Indian Cave, Grainger County	888 Jackson	♀	16.0	14.8	9.6	4.0	7.4	5.6	11.4	6.0	6.2	6.4	1
Do	889	♀	15.8	14.6	-----	4.2	7.8	5.4	11.4	6.0	6.5	6.6	1
Do	890	♀	15.6	14.8	-----	4.0	7.6	5.6	11.4	6.0	6.0	6.2	1
Do	891	♀	15.7	14.8	-----	4.0	7.8	5.8	11.6	6.0	6.4	6.4	1
Do	892	♀	15.9	14.6	10.0	4.0	7.4	5.8	11.4	6.0	6.2	6.4	1

[1] Type.

Cranial measurements of Myotis grisescens—Continued

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Tennessee—Continued.													
Indian Cave, Grainger County	894	♀	15.9	15.0	-----	4.0	7.6	6.0	11.8	6.0	6.2	6.4	3
Do	895	♀	15.8	14.8	9.8	4.0	7.4	5.8	11.8	6.0	6.1	6.4	1
Do	896	♀	16.1	15.0	10.0	4.0	7.8	5.8	11.8	6.0	6.4	6.4	1
Do	897	♀	16.0	15.0	10.0	4.0	7.8	5.8	11.6	6.2	6.1	6.6	3
Do	898	♀	16.0	15.2	10.0	4.0	7.8	5.8	11.6	6.2	6.1	6.6	1
Do	899	♀	15.9	15.0	10.2	4.2	7.8	5.8	11.4	6.0	6.4	6.4	3
Do	900	♀	16.0	15.0	10.0	4.0	7.8	6.0	11.4	6.2	6.2	6.4	2
Alabama:													
Fort Deposit	201698	♂	-----	15.0	9.8	4.0	8.0	6.0	11.6	6.0	6.2	6.4	3
Do	201699	♂	16.1	15.0	-----	-----	-----	6.0	11.4	6.0	6.5	6.2	1
Do	201700	♂	16.0	15.0	10.0	3.8	7.6	5.8	11.4	6.0	6.2	6.2	0
Do	201701	♂	15.8	14.8	10.0	4.0	7.8	6.0	11.4	6.0	6.2	6.2	1
Do	201702	♂	16.5	15.2	10.0	4.0	7.8	6.0	11.6	6.0	6.4	6.6	1
Do	201703	♂	16.0	15.0	-----	3.8	7.8	6.0	11.4	6.0	6.4	6.4	3
Do	201704	♂	16.2	15.0	10.0	4.0	7.6	-----	11.8	6.0	6.4	6.6	2
Do	201705	♂	15.8	14.8	10.0	4.0	7.8	6.0	11.2	5.8	6.3	6.2	2
Do	201706	♂	15.8	14.6	-----	4.0	7.6	6.0	11.2	5.8	6.3	6.2	0
Do	201707	♂	15.8	14.8	9.6	4.0	7.6	5.6	11.2	6.0	6.1	6.2	1
Rogersville	202020	♀	16.0	14.8	10.0	4.0	7.8	6.0	11.4	6.0	6.5	6.2	3
Do	202021	♀	15.8	14.6	9.4	4.0	7.4	5.4	11.2	5.8	6.1	6.2	1
Do	202022	♀	15.9	14.8	-----	4.0	7.4	5.6	11.8	6.0	6.2	6.4	3
Do	202024	♀	-----	15.0	10.0	4.2	8.0	6.0	12.0	6.2	6.6	6.6	2
Do	202025	♀	16.0	15.0	10.0	4.0	7.6	5.8	11.4	6.0	6.2	6.2	2
Do	202026	♀	16.0	15.0	-----	4.2	7.6	5.8	11.8	6.0	6.3	6.2	3
Do	202029	♀	15.9	15.2	9.8	4.0	7.4	-----	12.0	6.2	6.3	6.4	3
Do	202030	♀	15.7	14.8	-----	4.0	7.4	6.0	11.4	6.0	6.2	6.2	2
Do	202031	♀	15.9	15.0	9.8	4.0	7.8	5.6	11.6	6.0	6.3	6.2	3

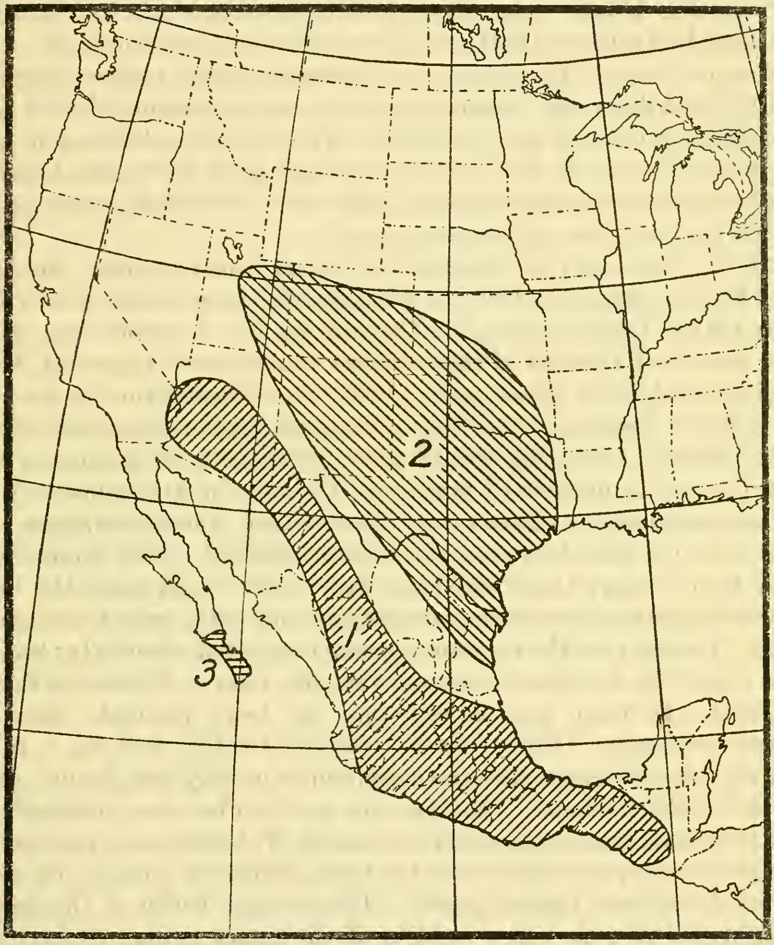
MYOTIS VELIFER (J. A. Allen)

(Synonymy under subspecies)

Distribution.—From Kansas and eastern Texas westward to southern Utah and southern California, thence southward through Mexico to the highlands of Guatemala.

Diagnosis.—Size large among the American species of *Myotis;* forearm usually 40 to 46 mm.; total length about 90 to 100 mm.; tail usually 39 to 42 mm.; average ratio of tail to head and body in 10 specimens from Arizona, 79.9; in 10 from Vera Cruz, 81.9, in 4 from Lower California, 82.2; greatest length of skull (except in a small race from Lower California) usually more than 16.5 mm. (15.6 to 17.6 mm.); maxillary tooth row 6.0 to 7.0 mm.; mandibular tooth row 6.2 to 7.2 mm.; greatest palatal breadth including molars slightly exceeding length of maxillary tooth row; hind foot slightly more than one-half as long as tibia; ear not specially elongated; pelage dull; sagittal crest well developed in adults; cheek teeth robust, the breadth of the maxillary teeth, as compared with that of the palate, obviously greater than in other American members of the genus, *Myotis occultus* excepted; upper molars with full complement of secondary cusps and ridges; cingulum on inner side of crown of m^1 and m^2 well developed and conspicuous.

Ears.—The ears are moderately long, reaching, when laid forward, to the nostril or slightly beyond it; tragus slender, about one-half the height of the ear, its anterior edge nearly straight, broadest at base, narrowing in the terminal half to a bluntly rounded tip, and provided with small lobule at its base posteriorly.



MAP 4.—DISTRIBUTION OF MYOTIS VELIFER: 1, M. VELIFER VELIFER; 2, M. VELIFER INCAUTUS; 3, M. VELIFER PENINSULARIS

Wing and membranes.—Wing membrane arising from base of toes. Third and fourth metacarpals usually subequal, the fifth decidedly shorter; when folded the third metacarpal reaches to within 2.5 to 3 mm. of the elbow. Taking the third finger as 100, the fourth is 86, the fifth 80 (72:62:57.5 mm.). Tail involved in the membrane except for the minute terminal and half the penultimate vertebrae which are free. Border of uropataguim sprinkled with widely spaced stiff hairs, scarcely visible without the aid of a lens.

Foot.—The foot is strong, usually a little more than half the length of the tibia, the ratio of its length to that of tibia averaging 51.2 in 10 specimens from Arizona, 53.4 in a like number from Michoacan, and 54.1 in 9 from Lower California. Calcar well developed, and terminating distally in a minute lobule, the skin along its free edge thickened on the basal half but without forming a distinct keel.

Fur and color.—The pelage is of moderate length, neither close nor yet full and fluffy, the longer hairs on the back averaging about 6 mm. in length, their tips not burnished. The general coloration is uniformly dull sepia or drab above, somewhat paler below, the bases of the hairs everywhere dark except at the sides of the belly underneath, where the hairs are whitish throughout.

Skull.—The skull is characterized by its broad rostrum, the area of which, when skull is viewed from above, is not conspicuously less than that of the brain case. (Pl. 1, p. 7, fig. 6.) Distance from anterior border of alveolus of inner incisor to narrowest region of interorbital constriction about equal to that from constriction to lambda. Breadth of rostrum across roots of canines greater than interorbital constriction. Maxillary breadth at m^3 (average in 20 specimens, 6.9) nearly equal to breadth of brain case (average in 20 specimens, 7.2). Brain case higher and narrower than that of *Myotis lucifugus.* In rear view the lambdoid crests are sharply defined. Seen from above they form a sharp transverse ridge posteriorly which meets the well-marked sagittal crest at the occiput and cuts off a raised triangular area. In side view the rostrum appears nearly flat anteriorly; behind this region the forehead rises more abruptly than in *Myotis lucifugus.*

Teeth.—In their general structure the teeth resemble those of *Myotis lucifugus.* The secondary cusps and ridges (see fig. 1, p. 8) are all fully developed but the cingulum is usually less distinct than in the smaller animal. The hypocone tends to be lower relatively to the protocone than is generally the case in *M. lucifugus*, a peculiarity which is best appreciated when the teeth of the two animals are compared from their lingual aspect. The greatest width of the palate measured across the outer borders of the upper molars slightly exceeds the maxillary tooth row (front of canine to back of m^3) and is practically equal to or is at most minutely less than the mandibular tooth row (exclusive of incisors). The maxillary rows of cheek teeth as a whole are obviously more robust (broader in proportion to the intervening area of palate) than is usual in other large American members of the genus. This character can not be described with sufficient definiteness to insure the identification of a single specimen taken by itself, but it is at once obvious on comparison of a few skulls of *Myotis velifer* with similar series of *M. thysanodes* or *M.*

grisescens or with a large individual of *M. lucifugus* as in Plate 1 (p. 7), Figures 3*a* and 3*b*. First and second upper premolars slightly drawn in from the tooth row so that the second is partly hidden in exterior view behind the front corner of the third premolar.

Habits.—*Myotis velifer* is a colonial species, typically a cave-dweller, so that its local distribution and abundance may frequently be conditioned in part by the presence of caves suitable for habitation. Ward (1891, 1904) found great numbers in a state of semi-hibernation in the tunnel-like caverns formed in lava, on the volcano of Perote, in Jalapa, Vera Cruz, Mexico, during the month of February. The animals are quick to take advantage of the artificial shelter offered by old buildings and are therefore considered as "house bats" in parts of Texas and Arizona. Bailey (1905) has described how they came from a considerable distance to drink at an artificial pool in the dry country at Carlsbad, Tex., flying apparently from the limestone hills several miles away, "straight for the water pool without a crook or turn." Mine tunnels are also used as roosting places.

Remarks.—In its structural details *Myotis velifer* suggests a large *Myotis lucifugus*, with the cheek teeth broadened but not sensibly altered in structure. The form of the skull is less flattened than in the smaller animal, the rostrum is broader, the interorbital constriction relatively narrower, and the brain case fuller and more globose, with sharply defined sagittal crest (compare figs. 3*a* and 3*b*, pl. 1, p. 7). Externally it resembles *Myotis grisescens*, which was confused with it by Miller in 1897, but it is readily distinguishable by the normal insertion of the wing membrane on the foot, and by the darkened bases of the hairs on the back.

MYOTIS VELIFER VELIFER (J. A. Allen)

Vespertilio albescens TRUE, Proc. U. S. Nat. Mus., vol. 7, p. 603, 1885 (part, not of Geoffroy).

Vespertilio velifer J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 3, p. 177, December 10, 1890.—H. L. WARD, Amer. Nat., vol. 25, p. 744, August, 1891.

Vespertilio albescens velifer H. ALLEN, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 92, March 14, 1894.—TROUESSART, Catal. Mamm. viv. foss., p. 132, 1897.

Myotis velifer MILLER, North Amer. Fauna, No. 13, p. 56, October 16, 1897.—TROUESSART, Catal. Mamm. viv. foss., p. 1285, 1899.—ELLIOT, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 401, March, 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 255, December 27, 1901.—ELLIOT, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 573, 1904.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 92, 1904.—WARD, Trans. Wisconsin Acad. Sci., vol. 14, p. 647, 1904.—BAILEY, North Amer. Fauna, No. 25, p. 208, October 24, 1905.—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 473, 1905; Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 500, 1907.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 93, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 93, April 29, 1924.

Myotis californicus jaliscensis MENEGAUX, Bull. Mus. d'Hist. Nat. Paris, vol. 7, p. 321, 1901 (near Lake Zacoalco, Jalisco, Mexico, type in Paris Museum).—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 31. p. 121, August 27, 1903.—ELLIOT, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 579, 1904.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 93, 1904.—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 477, 1905.

Type locality.—Santa Cruz del Valle, Guadalajara, Jalisco, Mexico.

Type specimen.—Adult male, skin and skull, No. 2696 Amer. Mus. Nat. Hist., collected at Santa Cruz del Valle, Guadalajara, Jalisco, Mexico, September 7, 1889, by Dr. A. C. Buller.

Distribution.—From the highlands of Guatemala northward to western Arizona and southern California.

Diagnosis.—Size slightly below the maximum for the species; greatest length of skull 15.6 to 17.0 mm.; color dark.

Description.—Topotypes are a dull "sepia" (Ridgway, 1912) above, the hairs with their basal three-fourths about "blackish brown"; below much paler, the tips of the hairs pale cream-buff, their dark "plumbeous-black" bases showing through slightly except at the borders of the thighs, where the hairs are pale cream buff throughout. Specimens from La Palma, Michoacan, Mexico, average a very little browner than two examined from Guadalajara. One in worn pelage from Lake Atitlan, Guatemala, is not appreciably different from topotypes. Northward from central Mexico to Arizona there seems to be very little change in tint. A skin from Tamaulipas, Mexico, and others from Tucson and the Mexican border (monument 77) of Arizona are scarcely distinguishable, and seem best referred to true *velifer*, while a series from Roosevelt County, Ariz., contains specimens some few of which are nearly as pallid as in *incautus*, while one or two are about as dark as typical Mexican examples, so that the series is taken to show that intergradation between the typical form and the eastern *M. velifer incautus* occurs in this region.

Measurements.—For measurements see tables, pages 94 and 96.

Ward (1904) presents a detailed study of the variations in proportions among a series of 167 bats of this species from Las Vegas, Vera Cruz. The forearm measurement averaged about 42 mm.

Specimens examined.—Total number 372, from the following localities:

ARIZONA: Big Sandy Creek, 3 skins, 16 alc. (U.S.N.M.); Ehrenburg, 1 skin, 1 alc. (U.S.N.M.); Gila Bend, Maricopa County, 1 skin (U.S.N.M.); Huachuca Mountains, 1 skin (F. M.), 2 alc. (M. C. Z.); Montezuma Well, 2 skins (U.S.N.M.); Nantan Plateau, 1 skin (U.S.N.M.); Roosevelt, 10 skins, 39 alc. (U.S.N.M.); Santa Rita Mountains, 1 skin (F. M.); Tucson, 1 skin, 1 alc. (U.S.N.M.); Tucson, 20 miles southwest, 1 skin (U. C.); no exact locality, 1 alc. (U.S.N.M.).

CALIFORNIA: Needles, 3 skins (U. C.).

DURANGO: Huasamota, 1 alc. (U.S.N.M.); Rio Sestin, 2 skins (A. M. N. H.); San Gabriel, 11 alc. (A. M. N. H.).

?"ECUADOR": 2 alc. (B. M.).

GUANAJUATO: Guanajuato, 25 alc. (U.S.N.M.).

GUATEMALA: Lake Atitlan, Panajachel, 1 skin (F. M.); Ciudad Vieja, 5 alc. (B. M.), 1 alc. (U.S.M.C.); Sierra Sta. Elena, 1 alc. (F. M.).

HIDALGO: Tulancingo, 1 skin, 3 alc. (U.S.N.M.).

JALISCO: Atenquique, 12 skins (A. M. N. H.); Guadalajara, 2 skins (U.S.N.M.), 2 alc. (B. M.), 3 skins including type (A. M. N. M.); Lake Zacoalco, 4 alc. (Paris), cotypes of *jaliscensis*, examined by Miller in 1904; Las Canoas, 5 skins (A. M. N. H.); San Marcos, 1 alc. (A. M. N. H.); Tonila, 1 skin (A. M. N. H.); Zavala, 7 alc. (A. M. N. H.).

LOWER CALIFORNIA: San Bernardino Ranch, 4 skins, 1 alc. (U.S.N.M.).

MEXICO STATE: Ixtlapalapa, 2 alc. (U.S.N.M.); Lerma, 1 alc. (U.S.N.M.); Mexico, 1 skin (U.S.N.M.); Valley of Mexico, 2 alc. (M. C. Z.).

MICHOACAN: Acambaro, 1 alc. (U.S.N.M.); El Molino, 1 alc. (B. M.); Lake Chapala, La Palma, 17 skins, 72 alc. (F. M.), 6 alc. (U.S.N.M.); Negrete, 2 alc. (U.S.N.M.); Patzcuaro, 3 skins, 8 alc. (U.S.N.M.), 5 skins, 3 alc. (F. M.).

MORELOS: Morelos, 10 alc. (U.S.N.M.).

NEW MEXICO: Fort Wingate, 1 alc. (U.S.N.M.).

OAXACA: Isthmus of Tehuantepec, 1 alc. (B. M.); Tehuantepec, 1 alc. (B. M.).

PUEBLA: Esperanza, 2 alc. (F. M.).

QUERETARO: Jalpan, 2 alc. (U.S.N.M.).

SAN LUIS POTOSI: Ahualulco, 1 alc. (U.S.N.M.); Rio Verde, 1 alc. (U.S.N.M.).

SONORA: San Bernardino Ranch, 4 skins, 1 alc. (U.S.N.M.).

VERA CRUZ: Las Vegas, 1 alc. (U.S.N.M.); Orizaba, 2 skins (U.S.N.M.), 5 skulls, 28 alc. (F. M.), 4 alc. (A. N. S. P.); Xuchil, 2 alc. (F. M.).

ZACATECAS: Hacienda San Juan Capistrano, 2 skins (U.S.N.M.).

Remarks.—Typical *Myotis velifer* is widely distributed on the Mexican table-land. The most southern record seems to be that of a specimen from Lake Atitlan, Guatemala, altitude 5,150 feet. Skins from central and northern Mexico are fairly uniform in tint, showing little or no approach to the pallid form *incautus* until the Texas border is reached. A single skin from near sea-level at Soto La Marina, Tamaulipas, though not quite so dark as the average of true *velifer* is yet not so pallid as typical *incautus*. Others from northern Sonora (San Bernardino Ranch at junction of the river of that name with the Cajon Bonito Creek) on the Mexican boundary are nearly typical, as are also three others from Big Sandy Creek, in western

Arizona, a skin from Tucson, Ariz., and one each from the Huachuca Mountains and the Santa Rita Mountains of the southeastern part of that State. It is in eastern Arizona and western Texas that intergradation takes place with the pale form, *incautus.* In this region the range of variation in tint among individuals from one locality is sometimes so great that it would be possible without violence to assign the extremes of a series to one or other of the two forms. Thus of two excellent skins from near the junction of the Pecos and Rio Grande Rivers, Tex., one is as dark as the average true *velifer*, while the other is as pale as typical *incautus.* Again, a series of 10 skins from Roosevelt, Ariz., is about intermediate; for while the darkest individuals are of nearly the same dark tone as typical *velifer*, the majority are paler, though none is quite as pallid as *incautus.* Since the two forms hardly differ except in tint, it is often not possible to assign alcoholic specimens with certainty to either, but in doubtful cases we have been guided by the indications of the series of skins.

There are two alcoholic specimens in the collection of the British Museum labelled "Ecuador," that were received many years ago from the Fraser collection. These appear to be perfectly typical *Myotis velifer*, but since there is no exact locality given and no other specimens are known from any part of South America, it seems likely that there has been some mistake, and that the locality "Ecuador" was supplied by inference, since Louis Fraser's name is so commonly associated with the zoology of that Republic.

MYOTIS VELIFER INCAUTUS (J. A. Allen)

Vespertilio sp., J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 8, p. 71, April 22, 1896.

Vespertilio incautus J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 8, p. 239, November 21, 1896.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 307, December 27, 1901.

V[espertilio] albescens? H. ALLEN, in Miller, North Amer. Fauna, No. 13, p. 59, October 16, 1897 (Texas specimens).

Myotis velifer MILLER, North Amer. Fauna, No. 13, p. 56, October 16, 1897 (part).—STRECKER, Check-List Mamm. Texas, The Baylor Bulletin, Baylor University, Waco, Texas, vol. 29, No. 3, p. 9, August, 1926.

Myotis incautus MILLER, Proc. Biol. Soc. Washington, vol. 15, p. 155, June 20, 1902.—J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 19, p. 611, November 12, 1903.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 31, p. 121, August 27, 1903.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 92, 1904.—BAILEY, North Amer. Fauna, No. 25, p. 209, October 24, 1905.—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 473, 1905.—HOWELL, Proc. Biol. Soc. Washington, vol. 22, p. 46, March 10, 1909.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 54, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 67, April 29, 1924.—STRECKER, Check-List Mamm. Texas, The Baylor Bulletin, Baylor University, Waco, Texas, vol. 29, No. 3, p. 9, August, 1926.

Type locality.—San Antonio, Bexar County, Tex.

Type specimen.—Adult male, skin and skull, No. $\frac{12214}{10566}$ Amer. Mus. Nat. Hist., collected at San Antonio, Tex., October 10, 1896, by H. P. Attwater.

Distribution.—Open arid country from Texas and New Mexico northeastward to Kansas; south in Mexico as far as Durango. (See map 4, p. 87.)

Diagnosis.—Size maximum for the species and for the American members of the genus (pl. 1, p. 7, fig. 4); greatest length of skull 15.8 to 17.6 mm.; color pallid.

Description.—Compared with that of true *Myotis velifer* the fur of *M. v. incautus* is usually of a much paler tint in mature animals. A paratype is nearly "tawny olive," with the bases of the hairs not quite so dark as in *M. velifer velifer;* below, the pale tips of the hairs are a trifle clearer, essentially the cartridge buff of Ridgway (1912).

Measurements.—For measurements see tables, pages 95 and 96.

Specimens examined.—Total number 80, from the following localities:

KANSAS: Medicine Lodge, 1 skin (U.S.N.M.); Sun City, 11 skins, 7 alc. (U.S.N.M.).

NEW MEXICO: Carlsbad, 14 skins (U.S.N.M.).

OKLAHOMA: Cache Creek, Comanche County, 2 skins (U.S.N.M.); Fort Reno, 3 alc. (U.S.N.M.).

TAMAULIPAS: Soto la Marina, 1 skin (U.S.N.M.).

TEXAS: East Painted Cave, 1 alc. (U.S.N.M.); Japonica, 2 skins, 5 alc. (U. S. N. M.); Lampasas, 1 alc. (U.S.N.M.); Langtry, 2 skins (U.S.N.M.); New Braunfels, 1 alc. (U.S.N.M.); Pecos River mouth, 4 alc. (U.S.N.M.); San Antonio, 1 skin (U.S.N.M.), 4 skins, including type (A. M. N. H.); Sonora, 10 alc. (U.S.N.M.); Toyahvale (Davis Mountains), 7 alc. (U. M.); Uvalde, 1 alc. (U.S.N.M.).

UTAH: Thistle Valley, 2 alc., young (U.S.N.M.).

MYOTIS VELIFER PENINSULARIS Miller

Myotis peninsularis Miller, Ann. and Mag. Nat. Hist., ser. 7, vol. 2, p. 124, August, 1898.—Trouessart, Catal. Mamm. viv. foss., p. 1285, 1899.—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 255, December 27, 1901.—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 573, 1904.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 92, 1904.—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 475, 1905.—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 55, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 67, April 29, 1924.

Type locality.—San José del Cabo, Lower California, Mexico.

Type specimen.—Adult female, skin and skull, No. 98.3.1.59 British Museum (Natural History), collected at San José del Cabo, Lower California, Mexico, August 12, 1896, by Loye Miller. Dane Coolidge collection, No. 718.

Distribution.—Southern end of the Lower California peninsula. (See map 4, p. 87.)

Diagnosis.—Size minimum for the species; forearm usually less than 40 mm.; greatest length of skull 14.2 to 15.6 mm.; color pallid.

Color.—Two color phases are exhibited in the original series: One duller, the other more intense; the duller specimens are not distinguishable except by size from dull specimens of the large *Myotis velifer incautus*, but the brighter-colored individuals are more reddish above, approaching "clay color."

Skull and teeth.—Except for their smaller size, the skull and teeth are counterparts of those of typical *Myotis velifer.*

Masurements.—For measurements see tables, pages 95 and 97.

Specimens examined.—Total number 25, from the following localities:

LOWER CALIFORNIA: La Paz, 1 alc. (U.S.N.M.); Miraflores, 5 skins (A. M. N. H.); San José del Cabo, 5 skins (B. M.), 5 skins (U.S.N.M.); Santa Anita, 3 alc. (U.S.N.M.); Santiago, 6 skins (C. A.).

Remarks.—It was supposed at first that "the extremely short tail of the new species," *Myotis peninsularis*, was "its most strongly marked character," as seemed to be indicated by the collector's flesh measurements. But this apparent peculiarity was doubtless due to some peculiar way of measuring, for in alcoholic specimens of the animal no such feature appears (ratio of tail to head and body in 4 specimens in alcohol 82.2, as compared with 81.9 in 10 from Vera Cruz and 79.9 in 10 from Arizona).

One skin in the original series (93553 U.S.N.M.) is albinistic with a considerable sprinkling of white hairs on the nape and especially on the lower back and the sides, where a noticeable patch of white is seen just behind each shoulder.

External measurements of Myotis velifer

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis velifer velifer													
Arizona:													
Roosevelt	212073	♂	44.4	36.2	16.2	8.2	40.4	6.8	37.0	35.4	14.8	12.2	9.4
Do	212074	♀	51.8	42.4	16.2	8.8	42.2	7.4	39.0	37.8	14.0	12.8	9.0
Do	212075	♀	51.8	42.2	18.0	9.4	42.4	7.2	39.4	37.4	14.8	11.2	9.4
Do	212087	♀	50.8	38.4	17.6	9.0	42.6	7.4	38.6	37.0	14.6	12.6	8.4
Do	212096	♂	47.0	41.2	17.2	8.6	41.6	7.0	37.2	35.8	14.4	11.4	9.0
Do	212098	♂	52.0	38.0	16.8	9.2	40.6	6.6	38.0	36.2	15.2	12.0	9.8
Do	212104	♀	48.6	42.4	17.0	8.8	42.4	7.2	38.0	36.0	14.0	12.2	9.2
Do	212105	♀	49.8	42.0	17.8	8.4	43.0	7.2	40.0	38.0	15.0	12.0	9.0
Do	212106	♂	50.0	41.6	17.6	9.0	43.0	6.4	38.4	37.0	14.6	13.0	10.0
Do	212107	♂	47.4	38.4	16.4	8.2	40.4	6.8	38.8	36.2	13.6	11.8	8.4

External measurements of Myotis velifer—Continued

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis velifer velifer—Continued													
Jalisco:													
Lake Zacoalco	[1] Paris	♂	52.0	42.0	18.0	7.8	44.0	7.4	-----	-----	16.0	13.0	10.4
Do	Paris	♂	50.0	40.0	16.4	8.0	42.0	7.0	-----	-----	15.0	12.4	11.0
Do	Paris	♀	53.0	42.0	17.4	8.0	42.6	7.6	-----	-----	16.6	13.6	10.2
Do	Paris	♀	51.0	41.0	16.6	8.8	43.6	8.0	-----	-----	15.0	12.6	10.4
Michoacan:													
Lake Chapala, La Palma.	8503 F. M.	♂	51.0	45.0	17.6	9.4	44.0	7.6	40.2	38.4	14.2	12.0	8.6
Do	8504	♂	50.2	40.4	18.0	10.0	45.4	6.8	42.0	40.2	15.0	13.0	9.2
Do	8505	♂	47.4	39.0	18.0	8.8	45.0	8.0	40.4	38.0	14.6	11.0	10.0
Do	8507	♂	51.0	39.8	16.8	8.8	43.4	7.6	40.8	38.0	14.4	12.0	9.4
Do	8509	♀	44.2	38.0	17.2	9.0	44.0	7.0	41.0	39.0	14.6	12.6	9.4
Do	8512	♀	52.4	46.0	19.0	9.4	45.0	7.4	41.8	40.0	15.4	12.6	9.0
Do	8577	♀	52.2	46.6	17.0	9.6	44.2	7.2	41.8	39.4	14.0	12.0	9.4
Do	8578	♀	54.2	42.4	18.0	9.2	46.0	7.2	42.2	40.8	15.2	13.6	10.4
Do	15847	♂	51.4	41.6	17.2	10.0	45.0	7.4	40.2	38.0	13.8	11.0	8.2
Do	15848	♀	50.0	39.0	17.0	10.6	42.4	7.8	38.0	36.0	15.0	11.6	9.6
Vera Cruz:													
Orizaba	14607 F. M.	♀	54.0	44.0	18.4	10.0	46.4	7.2	42.4	40.8	15.6	11.4	10.0
Do	14528	♀	54.2	39.6	18.0	8.4	45.6	7.4	41.2	39.6	14.0	11.0	8.2
Do	14612	♀	50.0	43.4	18.2	9.8	47.0	9.0	41.8	40.4	15.2	11.8	10.2
Do	14616	♂	52.2	39.0	18.0	8.4	43.2	7.2	40.0	37.6	15.8	12.6	9.8
Do	14526	♂	53.0	41.0	17.4	9.6	45.6	7.0	40.8	39.2	16.0	13.0	10.0
Do	14611	♂	51.0	38.0	17.2	9.2	44.0	7.2	40.2	38.8	15.2	12.8	9.0
Do	14521	♂	50.0	47.0	18.0	9.0	44.8	8.0	40.4	38.0	15.0	10.8	8.8
Do	14505	♀	52.0	45.0	17.6	9.0	45.4	7.4	41.4	39.6	15.0	12.0	9.4
Do	14530	♀	48.8	41.0	17.6	9.2	44.2	7.0	40.2	38.0	14.2	12.0	9.0
Do	14533	♂	50.4	44.6	18.0	10.0	45.6	8.0	42.0	41.0	15.6	13.2	9.6
Myotis velifer incautus													
Kansas:													
Sun City	203949	♀	53.8	46.8	18.0	8.6	45.4	7.2	42.4	40.8	13.4	11.4	9.0
Do	203950	♂	47.8	42.0	18.4	9.0	46.2	8.0	43.0	41.4	14.6	12.0	10.0
Do	203951	♂	52.4	39.6	17.0	9.0	44.6	7.6	41.2	39.0	13.0	11.6	11.0
Do	203952	♂	53.0	42.6	18.4	9.0	46.0	7.6	43.0	40.2	15.0	12.0	9.4
Do	203953	♂	48.0	41.0	17.4	9.2	43.6	8.0	40.8	39.0	14.8	12.0	9.2
Do	203954	♀	53.0	38.0	18.0	9.8	47.0	7.6	43.0	40.4	15.0	12.0	10.2
Do	203955	♂	53.2	41.2	17.8	8.6	47.0	6.8	42.0	40.0	14.0	11.4	9.0
Oklahoma:													
Fort Reno	19150	♂	50.0	43.2	18.2	10.2	45.6	8.4	42.4	41.0	15.4	12.4	11.4
Do	19151	♀	51.2	43.4	18.4	10.0	46.0	7.6	41.8	40.0	15.6	11.6	10.0
Do	19152	♀	48.4	43.4	19.4	10.2	46.6	8.0	42.6	41.6	14.2	12.0	8.8
Texas:													
East Painted Cave	23595	♂	51.4	40.2	18.0	10.0	43.0	7.8	40.2	38.0	14.6	12.0	10.0
Lampasas	233729	♂	49.0	46.0	18.0	8.0	43.8	7.0	41.0	39.4	15.2	12.8	10.2
Uvalde	230750	♀	52.0	36.0	18.4	9.6	43.8	7.0	39.0	37.4	14.8	11.6	9.0
Myotis velifer peninsularis													
Lower California:													
Santa Anita	148359	♂	46.0	38.2	15.4	8.0	39.2	6.0	36.4	34.2	14.6	11.8	9.0
Do	148360	♀	45.0	40.8	16.0	9.0	40.6	6.2	37.0	35.4	14.8	12.0	9.0
Do	148362	♀	48.0	40.4	15.0	8.0	40.0	6.6	37.0	35.0	15.4	12.0	9.2
La Paz	13687	♂	49.8	35.8	15.0	7.6	37.2	5.2	34.0	31.8	14.2	10.4	8.2
San José del Cabo	93551	♂	46.0	31.0	17.0	7.6	39.2	6.0	36.2	33.4	-----	-----	-----
Do	93552	♂	55.0	40.4	16.6	7.8	38.4	6.0	35.2	34.0	-----	-----	-----
Do	93553	♂	44.8	32.0	16.4	8.0	39.8	6.6	36.8	33.8	-----	-----	-----
Do	93554	♀	50.4	29.4	15.4	8.2	38.4	5.6	35.2	32.6	-----	-----	-----
Do	93555	♀	52.2	33.2	16.4	8.0	39.0	6.2	37.4	35.0	-----	-----	-----
Santiago	2698 C. A.	♂	-----	-----	16.0	8.4	-----	6.6	36.0	-----	-----	-----	-----
Do	2699	♂	-----	-----	15.0	7.8	37.0	6.6	34.0	32.4	-----	-----	-----
Do	2700	♂	-----	-----	15.6	8.4	38.6	6.6	36.0	33.6	-----	-----	-----
Do	2701	♂	-----	-----	16.4	7.8	39.4	6.2	35.6	33.2	-----	-----	-----
Do	2703	♀	-----	-----	17.0	8.4	39.6	6.6	35.6	34.0	-----	-----	-----
Do	2704	♀	-----	-----	16.4	8.4	39.4	6.8	36.6	34.8	-----	-----	-----

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[1] Cotypes of *Myotis californicus jaliscensis;* measured by Miller in 1904.

Cranial measurements of Myotis velifer

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis velifer velifer													
Arizona:													
Huachuca Mountains	1066 F. M.	♀	16.2	15.0	-----	4.0	7.4	5.8	12.2	6.2	6.7	7.0	1
Big Sandy Creek	118311 U.S.N.M.	♀	16.0	15.0	-----	4.0	7.6	5.8	12.4	6.6	6.8	7.0	3
Roosevelt	212203	♀	16.0	15.0	10.0	3.8	7.4	5.4	12.4	6.4	6.8	7.0	1
Do	212205	♀	16.0	15.4	10.2	3.8	7.2	5.8	12.6	6.4	6.6	7.0	2
Do	212206	♀	16.2	15.4	10.4	4.0	7.4	5.8	12.4	6.4	6.8	7.0	2
Do	212207	♀	16.0	15.0	10.6	3.6	7.6	6.0	12.0	6.6	7.0	7.0	1
Do	212208	♀	16.0	·15.2	10.4	3.8	7.6	5.6	11.8	6.6	7.0	7.0	2
Do	212209	♀	15.6	15.0	10.8	4.0	7.6	5.6	12.2	6.4	7.0	7.0	1
Do	212210	♀	15.6	14.8	10.4	3.8	7.2	5.8	12.0	6.2	6.8	6.8	1
Do	212211	♀	16.0	15.2	10.2	3.8	7.2	5.8	12.2	6.6	7.0	7.0	1
Do	212212	♀	15.6	14.8	10.0	3.8	7.2	5.6	11.8	6.2	6.6	7.0	1
Nantan Plateau	212716	♂	15.6	15.0	10.0	4.0	7.3	6.0	12.0	6.2	6.6	6.8	1
Lower California:													
San Bernardino Ranch	37000	♀	16.1	15.2	10.0	4.0	7.6	6.0	12.5	6.5	7.0	7.0	1
Do	37001	♀	-----	15.2	10.0	4.0	-----	-----	11.8	6.2	6.8	6.8	1
Do	37002	----	16.0	15.2	-----	3.8	7.2	5.8	12.0	6.2	7.1	6.8	0
Michoacan:													
La Palma	8442 F. M.	♂	16.0	15.0	-----	4.2	8.0	6.2	12.2	6.4	7.0	6.6	0
Do	8444	♂	-----	15.6	-----	4.2	8.0	-----	12.6	6.6	7.0	7.2	1
Do	8445	♂	16.4	15.6	10.4	4.0	7.8	5.8	12.4	6.8	7.0	7.0	0
Do	8446	♀	16.6	15.6	-----	4.0	7.6	6.0	12.6	6.4	7.0	7.2	1
Do	8447	♀	15.8	15.2	10.8	4.0	7.6	6.0	12.4	6.6	7.0	7.0	0
Do	8448	♀	16.6	16.0	11.0	4.0	8.0	6.0	12.8	6.6	7.4	7.2	1
Do	8449	♀	16.0	15.4	10.2	4.0	7.6	5.8	12.2	6.8	7.1	7.2	1
Do	8450	♀	16.2	15.4	10.4	4.0	7.8	5.8	12.4	6.6	7.0	6.8	----
Patzcuaro	50781 U.S.N.M.	♂	16.4	16.0	11.0	4.0	7.8	6.0	13.0	6.8	7.0	7.2	0
Do	50790	♂	16.0	15.4	11.6	3.8	7.8	6.0	12.6	6.4	7.0	7.0	1
Do	8784 F. M.	♂	17.0	16.2	-----	4.0	7.8	6.0	12.8	6.8	7.3	7.0	1
Do	8785	♂	16.0	15.6	-----	4.0	7.8	6.4	12.4	6.4	6.8	7.0	1
Do	8786	♀	16.0	15.2	10.4	3.8	7.2	5.8	12.2	6.4	7.0	7.0	0
Do	8787	♀	16.4	15.4	-----	4.0	7.6	5.8	12.6	6.8	7.0	7.0	0
Do	8788	♀	17.0	16.0	11.0	4.0	8.0	6.2	12.8	6.8	7.2	7.2	1
Zacatecas:													
San Juan Capistrano	90920	♂	16.2	15.0	10.0	3.6	7.2	5.8	12.0	6.4	6.8	7.0	2
Do	90921	♀	16.0	15.0	-----	4.0	7.4	5.4	11.8	6.4	6.8	6.8	2
Jalisco:													
Guadalajara	187276	♂	16.9	16.0	-----	4.0	7.6	6.0	13.0	6.6	7.0	7.2	2
Do	187277	♂	16.5	15.4	10.4	4.0	7.8	6.0	12.4	6.6	7.0	7.2	0
Vera Cruz:													
Orizaba	37451	----	-----	16.4	10.4	4.0	7.6	5.8	12.6	6.8	-----	7.2	1
Do	37702	----	-----	-----	-----	4.0	7.8	-----	12.6	6.6	7.0	7.2	3
Do	14534 F. M.	♀	17.0	16.2	11.2	4.0	8.0	6.0	13.0	7.0	7.2	7.2	1
Xuchil	14516 F. M.	♀	16.2	16.0	11.0	4.0	8.0	5.8	12.6	6.8	7.0	7.2	0
Guatemala:													
No exact locality	36571 U.S.N.M.	---	15.8	15.2	-----	3.6	7.4	6.0	12.0	6.6	6.6	6.8	0
Sierra Sta. Elena	15957 F. M.	♀	16.2	15.4	10.4	4.0	7.4	5.6	12.2	6.4	6.8	7.0	1
Myotis velifer incautus													
Kansas:													
Medicine Lodge	145926	♂	16.2	16.0	10.6	4.0	8.0	6.0	12.6	6.6	7.1	7.0	0
Sun City	170939	♂	16.0	15.8	10.8	4.0	7.8	6.0	12.2	6.6	7.1	7.0	1
Do	170940	♂	16.4	16.0	10.6	4.0	7.6	6.0	12.2	6.6	7.0	7.0	0
Do	170941	♂	17.0	16.4	11.0	4.0	8.0	5.8	12.8	6.8	7.1	7.2	1
Do	170943	♂	16.6	15.8	10.6	4.0	7.6	6.0	12.4	6.8	7.0	7.2	1
Do	170935	♀	17.6	16.6	11.2	4.0	8.0	6.4	13.0	6.8	7.2	7.2	0
Do	170936	♀	16.8	16.6	11.0	4.0	8.0	6.0	13.0	6.6	7.1	7.0	0
Do	170937	♀	16.8	16.0	11.0	4.0	8.0	6.4	12.8	6.8	7.2	7.2	1
Do	170938	♀	17.0	15.8	11.0	4.0	7.8	6.0	12.6	6.8	7.0	7.2	0
Do	170942	♀	16.8	16.0	11.0	3.8	8.0	6.4	13.0	6.8	7.3	7.2	2
Do	170944	♀	16.8	16.0	10.8	4.2	8.0	6.2	12.8	6.8	7.3	7.2	0
Do	170945	♀	16.2	15.8	11.0	4.0	7.8	6.0	12.6	6.6	7.2	7.0	1
Oklahoma:													
Fort Reno	38676	♂	16.8	16.0	11.2	4.2	8.2	6.0	12.4	7.0	7.4	7.2	1
Do	38677	♀	17.0	16.2	11.0	4.0	8.2	6.0	-----	6.8	7.2	7.2	0
Do	38678	♀	16.0	15.8	-----	4.0	8.0	5.8	12.2	6.6	6.9	7.0	0
New Mexico:													
Carlsbad	110383	♂	16.0	15.0	10.2	4.0	7.8	6.0	11.8	6.2	6.8	7.0	2
Do	110384	♂	17.0	16.0	10.8	4.2	8.0	6.0	12.2	6.6	7.0	7.0	1
Do	110385	♂	16.2	16.0	11.0	4.0	7.8	6.0	12.8	6.6	6.8	7.2	1
Do	110386	♂	16.0	15.	10.2	4.0	8.0	6.0	12.2	6.4	7.0	6.8	2

Cranial measurements of Myotis velifer—Continued

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis velifer incautus—Continued													
New Mexico—Continued.													
Carlsbad	244456	♂	16.2	15.6	10.4	3.8	7.8	5.8	12.0	6.6	7.0	7.2	2
Do	109210	♀	16.6	15.6	10.4	4.0	7.8	6.0	12.6	6.8	7.2	7.0	1
Do	109211	♀	15.8	15.2	10.2	4.0	8.0	6.0	12.0	6.6	7.0	7.0	1
Do	109212	♀	16.7	15.8	11.0	4.0	7.8	5.8	-----	6.6	7.0	-----	1
Do	109213	♀	16.0	15.4	10.6	4.0	7.8	6.2	12.2	6.4	7.0	7.0	2
Do	224454	♀	16.0	15.0	10.2	4.2	7.8	6.0	12.0	6.2	6.8	6.8	1
Do	244457	♀	16.6	15.8	10.2	4.0	7.8	5.8	12.6	6.6	6.8	7.0	1
Do	244458	♀	16.4	15.8	10.6	4.0	8.0	5.8	12.8	6.6	6.8	7.2	1
Do	244459	♀	15.8	15.2	10.0	3.8	7.6	5.6	12.0	6.4	6.8	7.0	0
Texas:													
San Antonio	113667	♀	16.1	15.0	-----	4.0	7.6	6.0	12.0	6.6	6.8	7.0	0
Langtry	126277	♂	16.0	15.4	-----	4.0	7.6	6.0	12.2	6.6	6.7	7.0	3
Do	126276	♀	16.2	15.6	10.8	4.0	7.8	6.0	12.8	6.8	7.0	7.0	3
Mouth of Pecos River	49329	♂	16.4	6.0	10.8	4.2	8.0	5.8	12.6	6.8	7.0	7.2	1
Tamaulipas: Soto la Marina	116606	♀	16.8	15.8	11.0	4.0	8.0	5.8	12.6	6.8	7.0	7.2	1
Myotis velifer peninsularis													
Lower California:													
La Paz	38600	♂	14.2	13.6	9.4	3.6	7.0	5.2	11.0	6.0	6.1	6.2	1
Santa Anita	148359	----	15.0	14.2	-----	3.6	7.0	5.2	11.2	6.2	6.3	6.4	0
Do	148360	----	14.8	14.2	10.0	3.8	7.2	5.4	11.2	6.0	6.1	6.4	0
Do	148362	----	15.4	14.8	10.0	3.8	7.2	5.8	11.6	6.2	6.5	6.6	1
San José del Cabo	93552	♂	15.6	14.2	10.0	3.6	7.2	5.4	11.8	6.2	6.5	6.4	1
Do	93553	♂	15.0	14.6	9.8	3.6	7.0	5.6	11.6	6.0	6.3	6.4	1
Do	93554	♀	14.6	13.8	9.2	3.4	7.0	5.2	11.2	6.0	6.3	6.4	0
Do	93555	♀	15.4	14.8	10.2	3.6	7.2	5.6	12.0	6.0	6.4	6.4	1
Do	93551	♂	15.0	14.0	9.6	3.6	7.2	5.4	11.4	6.2	6.2	6.6	1
Do	98.3.1.20 B.M.	♂	14.8	14.2	9.4	3.6	7.0	5.6	11.2	6.0	6.6	6.4	1
Do	21	♂	15.0	14.4	9.8	3.6	7.0	5.4	11.6	6.2	6.4	6.6	1
Do	22	♂	-----	14.2	9.0	3.8	7.2	5.2	11.2	6.0	6.5	6.4	0
Do	23	♀	15.0	14.2	9.8	3.8	7.0	5.4	11.2	6.2	6.5	6.6	
Do	24	♀	15.0	14.0	-----	3.4	7.0	5.2	11.2	6.0	6.4	6.4	1
Santiago	2698. C. A.	♂	15.6	14.6	9.8	3.6	7.2	5.2	12.0	6.2	6.4	6.6	1
Do	2699	♂	15.2	14.6	9.6	3.6	7.0	5.0	11.4	6.2	6.2	6.6	1
Do	2700	♂	15.2	14.4	10.0	3.8	7.0	5.4	11.4	6.2	6.4	6.8	1
Do	2701	♂	15.4	14.6	9.8	3.6	7.2	5.2	12.0	6.2	6.2	6.6	1
Do	2703	♀	15.6	14.8	10.0	3.6	7.0	5.4	12.0	6.4	6.6	7.0	1
Do	2704	♀	15.6	14.8	10.0	3.8	7.2	5.6	11.6	6.2	6.6	7.0	1

MYOTIS OCCULTUS Hollister

Myotis lucifugus longicrus MILLER, North Amer. Fauna, No. 13, p. 65, October 16, 1897 (part; one of the two specimens listed from San Francisco Mountain, Arizona).

Myotis sp., J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 22, p. 235, July 25, 1906 (Sinaloa).

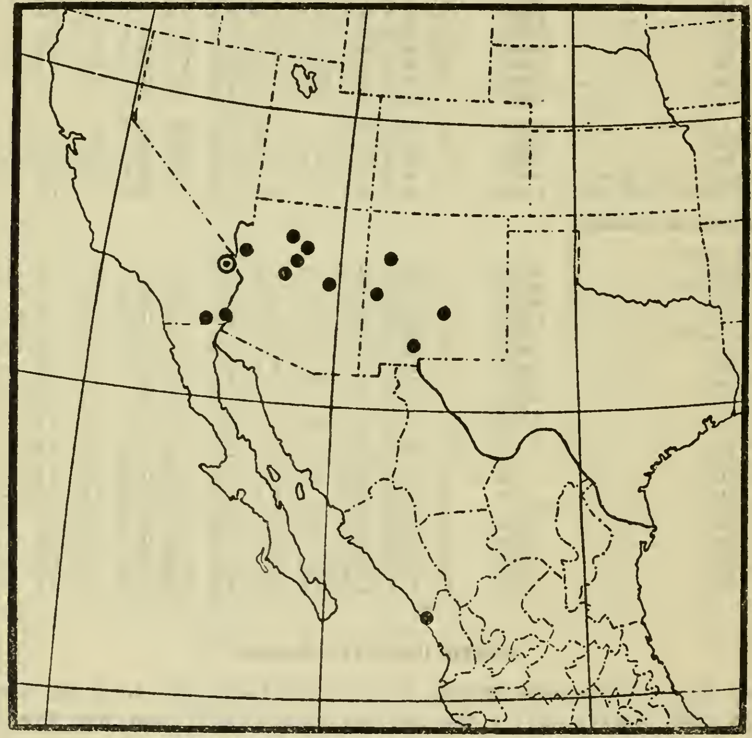
Myotis occultus HOLLISTER, Proc. Biol. Soc. Washington, vol. 22, p. 43, March 10, 1909.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 55, December 31, 1912.—J. GRINNELL, Proc. California Acad. Sci., ser. 4, vol. 3, p. 276, August 28, 1913; Univ. California Publ. Zool., vol. 12, p. 263, March 20, 1914.—ELLIOT, Check-List Mamm. North Amer., suppl., p. 155, 1917.—H. W. GRINNELL, Univ. California Publ. Zool., vol. 17, p. 261, January 31, 1918.—J. GRINNELL, Univ. California Publ. Zool., vol. 21, p. 314, January 27, 1923.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 68, April 29, 1924.

Myotis baileyi HOLLISTER, Proc. Biol. Soc. Washington, vol. 22, p. 44, March 10, 1909 (Ruidosa, New Mexico).—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 55, December 31, 1912.—ELLIOT, Check

List. Mamm. North Amer., suppl., p. 154, 1917.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 67, April 29, 1924.
Myotis bayleyi LYDEKKER, Zool. Record, 1909, Mammalia, p. 59, 1910 (misprint).

Type locality.—West side of the Colorado River, 10 miles above Needles, San Bernardino County, Calif.

Type specimen.—Adult male, skin and skull, No. 137098 United States National Museum (Biological Survey collection), collected on the west side of the Colorado River, 10 miles above Needles, Calif., May 14, 1905, by N. Hollister. Original No. 2237.



MAP 5.—DISTRIBUTION OF MYOTIS OCCULTUS

Distribution.—From central and southwestern New Mexico, across the southern half of Arizona southwestward on the Mexican highlands as far at least as southern Sinaloa.

Diagnosis.—Size and general external characters about as in *Myotis velifer peninsularis* (average ratio of tail to head and body in 7 specimens, 81.8), but color strongly ochraceous and hairs of back with obviously burnished tips which impart to the fur a gloss like that present in *M. lucifugus;* skull with rostrum even more enlarged relatively to area of brain case than in *M. velifer* (compare figs. 8 and 6 of pl. 1, p. 7); brain case lower and more flattened than in *M. lucifugus lucifugus*. not higher and narrower as in *M. velifer;* cheek teeth enlarged as in *M. velifer*, but small premolars showing an obvious tendency toward crowding and elimination.

Ears, membranes, and feet.—The general features of external form do not differ appreciably from those of *Myotis velifer*. Average ratio of foot to tibia in 10 specimens, 51.9.

Fur and color.—The fur is more full and soft than that of *Myotis velifer*, its quality essentially as in *M. lucifugus*. Tips of hairs on upper surface of body distinctly burnished.

Color above bright ochraceous tawny. Below ochraceous buff, sometimes with a grayish tinge; bases of the hairs both above and below blackish-slate. Ears and membranes brownish. This phase is brightest in the series of six skins from near Yuma, in the collection of the Museum of Vertebrate Zoology, University of California. A duller, olive phase essentially like the ordinary coloring of typical *Myotis lucifugus* also occurs in specimens from parts of Arizona and New Mexico. Immature individuals may be nearly wood-brown above, and grayish below. The ears and membranes of some individuals are blackish.

Skull.—The skull is well differentiated from that of any other American species of *Myotis* by the combination of low, flattened brain case and enlarged rostrum. When the skull is viewed from above (pl. 1, p. 7, fig. 8) the area of the rostrum as compared with that of the brain case is greater than in any other American member of the genus yet discovered. This character is obvious when the skull is compared with that of *Myotis velifer* (pl. 1, p. 7, fig. 6); it is very conspicuous on comparison with *M. lucifugus* (pl. 1, p. 7, fig. 12) and still more so on comparison with *M. volans*, one race of which occurs in the same region as *M. occultus* and bears a superficial external resemblance to it. Breadth of rostrum across canines decidedly greater than interorbital constriction. Distance from anterior border of alveolus of inner incisor to narrowest region of interorbital constriction frequently exceeding that from narrowest part of constriction to lambda. Sagittal crest always present in adults but rarely as high as in average specimens of *Myotis velifer*.

Teeth.—The larger cheek teeth of *Myotis occultus* present the same feature of unusual robustness which characterizes those of *M. velifer* and distinguishes these two species from the other American members of the genus. Secondary cusps and ridges as in *Myotis velifer*. The small premolars are peculiar in the tendency which they show toward crowding and elimination. The second premolar in the upper jaw (p^3), rarely found to be missing in other American *Myotis*, is more often absent than not (seventeen times in 24 specimens); and if it is present, it is usually pushed out of the tooth row into the angle between the first and fourth premolars, where it is not visible in side view. In the lower jaw the second premolar is normally present (lacking on both sides in 2 out of 24 skulls), but it is crowded inward from the tooth row, or sometimes stands quite in the row though closely pressed between the two other premolars.

Measurements.—For measurements see tables, pages 100 and 101.

Specimens examined.—Total number 27, from the following localities:

ARIZONA: Fort Verde, 1 skin (A.M.N.H.); Fort Whipple, 1 skin (U.S.N.M.); Lakeside, 3 alc. (U.S.N.M.); Mojave Desert, 1 skin (U.S.N.M); Montezuma Well, 1 skin (U.S.N.M.); San Francisco Mountain, 1 alc. (U.S.N.M.).

CALIFORNIA: Imperial County, ten miles above Needles, 1 skin, 1 alc. (U.S.N.M.), type of *occultus;* 4 miles south of Potholes, 1 skin (U.C.); 5 miles northeast of Yuma, 5 skins (U.C.).

NEW MEXICO: Luna, 3 skins (U.S.N.M.); Ruidosa, 1 skin, type of *baileyi,* 2 alc. (U.S.N.M.); Zuni Mts., Bear Ridge, 4 skins (U.S.N.M.).

SINALOA: Escuinapa, 1 skin (A.M.N.H.).

Remarks.—The combination of large rostrum, flattened brain case and burnished fur differentiates *Myotis occultus* very sharply from other American species. Unusually robust cheek teeth are also found in *M. velifer* but in this animal the brain case is high and the rostrum is less enlarged. Elimination of the second upper unicuspid tooth is here more frequent than in any other known American species. Externally *Myotis occultus* differs from *M. velifer* in the glossy fur, ochraceous color of the back, and conspicuously buff underparts.

The series of specimens now available shows that the characters which Hollister regarded as distinguishing *Myotis baileyi* from *M. occultus* lie within the range of individual variation.

External measurements of Myotis occultus

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
New Mexico:													
Ruidosa	[1] 125787	♀	45.0	-----	17.4	8.6	40.6	7.0	37.6	36.0	-----	-----	-----
Do	125788	♀	44.0	40.6	16.4	9.2	37.0	7.0	36.0	34.8	14.6	11.2	9.0
Do	125789	♀	46.0	35.0	16.4	8.0	38.4	7.4	34.0	34.0	14.4	11.8	9.4
Luna	158583	♂	49.8	29.6	16.0	7.8	38.0	6.6	33.0	31.4	-----	-----	-----
Do	158584	♂	49.0	34.0	16.0	8.2	36.4	6.0	33.0	31.0	-----	-----	-----
Do	158585	♀	49.0	32.8	14.4	-----	37.0	6.0	34.0	33.8	-----	-----	-----
Zuni Mountains	160073	♂	49.0	32.8	17.0	8.0	39.4	6.8	37.0	34.8	-----	-----	-----
Do	160074	♂	49.8	33.6	17.2	8.0	39.0	6.0	37.0	34.0	-----	-----	-----
Do	160076	♂	45.0	32.6	17.2	8.0	-----	7.0	35.6	35.0	-----	-----	-----
Do	160077	♀	49.0	-----	17.0	8.6	-----	6.4	36.0	35.0	-----	-----	-----
Arizona:													
Lakeside	209917	♂	45.4	37.4	17.0	8.2	40.2	6.2	36.0	33.6	14.8	12.4	9.6
Do	209918	♂	47.8	37.0	17.0	9.0	40.4	6.6	37.0	35.8	15.0	12.4	10.0
Do	209919	♀	48.8	38.2	16.6	9.0	39.8	7.0	36.0	-----	15.0	12.2	9.8
Montezuma Well	214686	♀	50.4	32.0	15.6	7.8	36.2	6.2	34.8	33.0	-----	-----	-----
San Francisco Mountain	18695	♂	48.0	39.0	16.8	8.0	39.4	6.8	35.6	34.4	14.4	10.6	9.2
California:													
Needles	137461	♀	44.0	33.8	14.6	9.0	36.6	6.0	34.0	31.6	14.4	12.0	9.8
Do	[2] 137098	♂	43.8	39.2	16.0	8.0	33.0	6.2	33.2	31.8	11.2	10.6	9.0

[1] Type of *Myotis baileyi* Hollister.

[2] Type.

Cranial measurements of Myotis occultus

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth-row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
New Mexico:													
Luna	158583 U.S.N.M.	♂	15.2	14.2	-----	3.9	7.5	5.0	11.0	6.0	6.2	6.2	0
Do	158584	♂	15.3	14.4	-----	4.0	7.2	4.9	11.2	6.1	6.0	6.5	0
Do	158585	♀	15.0	14.6	-----	3.8	7.0	5.0	11.6	6.0	6.4	6.8	0
Ruidosa	[1] 125787	♀	15.6	15.0	10.0	4.0	7.6	5.4	11.6	6.0	6.6	6.8	0
Do	125788	♀	15.4	15.0	10.0	4.0	7.4	5.4	11.6	6.0	6.4	6.4	0
Do	125789	♀	15.0	14.2	9.4	3.8	7.1	5.0	11.2	6.0	6.4	6.4	1
Zuni Mountains	160073	♂	-----	-----	-----	-----	-----	-----	12.3	6.4	6.8	7.0	3
Do	160074	♂	-----	-----	10.1	3.9	-----	-----	12.2	6.4	6.6	7.0	2
Do	160076	♂	16.0	15.4	10.5	3.8	7.5	5.2	12.2	6.4	6.6	7.0	1
Do	160077	♀	15.8	15.0	10.4	4.0	7.8	5.2	12.6	6.6	6.8	7.0	3
Arizona:													
Fort Verde	2451 bis A.M.N.H.	♀	-----	-----	-----	3.9	-----	-----	11.4	6.0	6.0	6.1	-----
Lakeside	209917 U.S.N.M.	♂	15.4	14.6	9.8	3.6	7.2	5.0	11.9	6.0	6.2	6.3	2
Do	209918	♂	-----	15.1	9.5	3.7	7.3	5.0	11.8	5.8	6.2	6.5	-----
Do	209919	♀	16.0	15.0	-----	4.0	7.4	5.3	12.0	6.0	6.2	6.7	2
Montezuma Well	214686	♀	15.2	14.4	9.3	3.9	7.5	5.0	11.2	5.6	5.8	6.1	0
San Francisco Mountain	38905	♂	16.0	15.0	10.0	4.2	7.6	5.0	11.8	6.2	6.6	6.8	
California:													
Needles	[2] 137098	♂	15.0	14.6	9.6	4.0	7.0	4.9	11.2	5.8	6.4	6.2	1
Do	137461	♀	15.0	14.0	10.0	3.9	7.3	5.0	11.0	5.6	6.2	6.2	1
Near Yuma	10703 U.C.	♀	-----	-----	9.8	4.0	-----	-----	11.4	6.3	6.0	6.5	0
Do	10704	♀	15.7	15.0	10.4	4.0	7.6	5.2	11.6	6.3	5.8	6.5	2
Do	10705	♀	15.0	14.5	9.8	3.9	7.4	5.2	11.3	6.3	5.9	6.4	1
Do	10706	♂	15.6	14.7	9.7	4.1	7.5	5.0	11.7	6.4	5.8	6.2	2
Do	10707	♀	15.4	14.8	10.0	4.0	7.5	5.1	11.2	6.2	5.9	6.2	2
Potholes	10702	♀	15.4	14.6	10.0	3.8	7.5	5.1	11.6	6.3	5.7	6.4	1

[1] Type of *Myotis baileyi* Hollister.

[2] Type.

MYOTIS KEENII (Merriam)

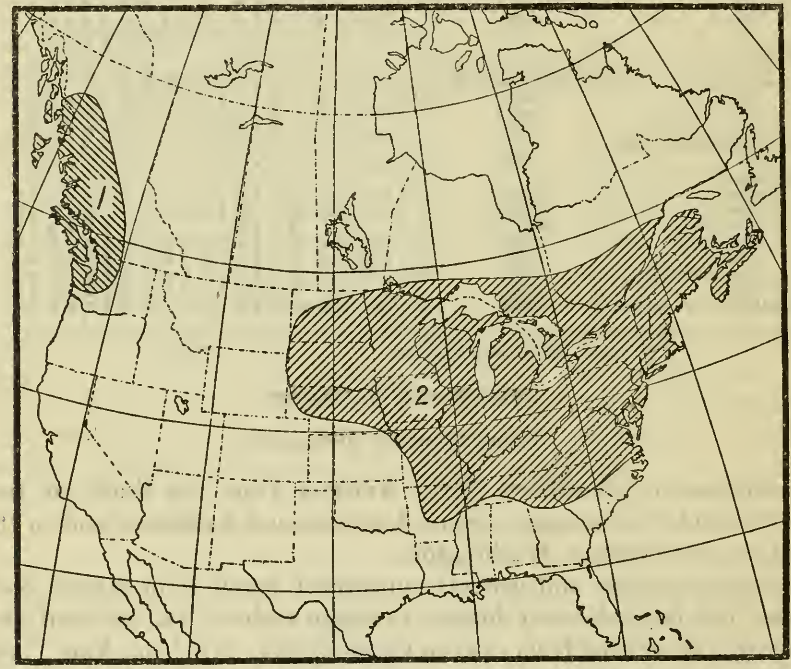
(Synonymy under subspecies)

Distribution.—Northern North America from the limits of tree growth south in the east to South Carolina and Arkansas, and in the west to northwestern Washington.

Diagnosis.—Size and general appearance much as in *Myotis lucifugus*, but tail relatively longer (average ratio of tail to head and body in 8 specimens from eastern Canada, 85.3; in 8 from New York, 89.4; in 5 from Missouri, 87.4; and in 5 from the Northwest Coast 85.7); ear actually longer (height from meatus usually 15.6 to 17.0 mm.), extending slightly beyond tip of nose when laid forward; tragus more slender; foot about half as long as tibia instead of obviously more than half as long; forearm usually 35 to 38 mm.; skull more slender than that of *M. lucifugus* (compare pl. 1, p. 7, figs. 15 and 14), its greatest length ranging from 14.8 to 15.6 mm.; sagittal crest occasionally present; maxillary tooth row about 6 mm. in length and slightly exceeding the greatest width of palate including molars.

Ears.—The ears are narrower and longer than in *Myotis lucifugus;* when laid forward they reach about 4 mm. beyond the nose (alcoholic specimens). Tragus long, the distance from its inner base to tip about 47 per cent of total height of ear (8:17 mm.); its inner margin straight, its outer edge with a small rounded basal lobe, succeeded by a shallow notch, above which it is nearly straight to the acute tip.

Wing and membranes.—Wing membranes from the base of the toes. Metacarpals 3, 4, and 5 practically equal in length (in an abnormal individual *mc* 4 of the right side is 2 mm. shorter than 3 and 5). When folded, the third metacarpal falls 2 mm. short of the elbow. Fourth and fifth fingers of nearly equal length; taking the third finger as 100, the fourth is 84, and the fifth is 82 (61: 52: 51 mm.). The edge of the uropatagium is essentially bare, though with the aid of a lens, a few short hairs may sometimes be seen at irregular intervals, along its border, occurring singly, and never forming a fringe. Terminal caudal vertebra and most of the penultimate vertebra free from membrane.



Map 6.—Distribution of Myotis keenii: 1, M. keenii keenii; 2, M. keenii septentrionalis

Foot.—The foot is usually a little more than half the length of the tibia; in 6 specimens from the Pacific coast the ratio of foot to tibia averages 51.2; in 10 from the northeastern part of the animal's range it averages 50.4; and in a series containing the same number from Illinois, Indiana, Wisconsin, Tennessee, and Missouri it averages 50.5; in exceptional individuals it falls as low as 45.2. Calcar long, slightly thickened at the base, terminating in a small lobule situated about one-half the distance from the foot to the tip of tail.

Fur and color.—Pelage fine and full, the longest hairs on the back about 9 mm. in length. The quality and distribution of the fur are essentially as in *Myotis lucifugus*, but the longer hairs tend to be less burnished; consequently the back is usually less glossy, a character not always obvious in single specimens but quite apparent when series of skins of the two animals are compared. The general color approximates that of two of the races of *Myotis lucifugus*—the typical form in the east, and *M. lucifugus alascensis* on the northwest coast.

Skull.—The skull is narrower in proportion to its length than that of *Myotis lucifugus*, so that the distance from the last molar to the tip of the hamular process exceeds the distance between the last molars instead of equalling it as it does in *M. lucifugus*, while the length of the maxillary tooth row (front of canine to back of last molar) very slightly exceeds the greatest palatal width including the upper molars whereas in *M. lucifugus* the reverse is true. In dorsal view the less robust rostrum is usually an evident feature of the skull as compared with that of *M. lucifugus*, and the width of the interorbital constriction less evidently exceeds that of the rostrum across roots of canines (compare pl. 1, p. 7, figs. 13 and 12). From the skull of *Myotis evotis* that of *M. keenii* is distinguishable by its smaller size and relatively smaller auditory bullæ.

Teeth.—As compared with the teeth of *Myotis lucifugus*, those of *M. keenii* may in most instances be distinguished by rather obvious peculiarities in the structure of the upper molars. The protoconule and metaloph are less developed, the metaloph usually confined to the bottom of the valley between the bases of the hypocone and metacone. The main cusps on the lingual side of the crown tend to be less robust, a feature which is especially noticeable in the protocone; this cusp, when compared with the protocone of *Myotis lucifugus lucifugus*, having a peculiar shrunken appearance, difficult to describe, but appreciable after comparison of a few specimens of the two animals. The cingulum, on the other hand, is better developed, rather frequently extending uninterruptedly around the entire base of the protocone, a condition which occurs in 13 out of 44 skulls selected at random, while it is not once found in 30 skulls of *M. lucifugus lucifugus.* The structure of the teeth in *Myotis keenii* is essentially similar to that in *M. evotis*, but the size of the molars is obviously less than in the longer-eared animal, the crown of m^2 usually about 1.25 to 1.35 by 1.60 to 1.75 mm. instead of 1.45 to 1.50 by 1.95 to 2.00 mm., a difference appreciable to the unaided eye, even without direct comparison of specimens.

Remarks.—This bat may readily be distinguished from *Myotis lucifugus*, with which it is everywhere associated, by the approximately equal instead of obviously graded metacarpals, nearly equal fourth and fifth fingers, the longer ears and tragus, less glossy fur, more buffy color, the size and proportions of the skull, and the more reduced condition of the smaller molar cusps. From *Myotis evotis*, together with which it occurs in the western part of its range, it is distinguished by slightly smaller size, less elongated ears, and smaller teeth.

MYOTIS KEENII KEENII (Merriam)

Vespertilio subulatus keenii MERRIAM, Amer. Nat., vol. 29, p. 860, September, 1895.

Myotis lucifugus alascensis MILLER, North Amer. Fauna, No. 13, p. 63, October 16, 1897 (part, specimen from Wrangell, Alaska).

Myotis subulatus keenii MILLER, North Amer. Fauna, No. 13, p. 77, October 16, 1897.—TROUESSART, Catal. Mamm. viv. foss., p. 1284, 1899.—ELLIOT, Synops. Mamm. North Amer., Field Colum. Mus., publ. 45, zool, ser., vol. 2, p. 405, March, 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 518, June, 1901.—OSGOOD, North Amer. Fauna, No. 21, p. 37, September 26, 1901.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 258, December 27, 1901.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 94, 1904.—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 478, 1905.—LYON and OSGOOD, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 271, January 28, 1909.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 58, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull, U. S. Nat. Mus., No. 128, p. 72, April 29, 1924.

Type locality.—Massett, Graham Island, Queen Charlotte Islands, British Columbia, Canada.

Type specimen.—Young adult female (in alcohol), No. 72922 U. S. Nat. Mus. (Biological Survey Collection), collected at Massett, Graham Island, Queen Charlotte Islands, British Columbia, Canada, 1894, by J. H. Keen.

Distribution.—Humid northwest coast region from northern British Columbia and southeastern Alaska to northwestern Washington. (See map 6, p. 102.)

Characters.—A saturate, northwest-coast form; ears conspicuously black.

Color.—Upperparts a rich glossy brown, nearly the Dresden brown or buckthorn brown of Ridgway, the fur very dark slaty brown beneath the surface; underparts distinctly more buffy than back; ears black; membranes very dark brown or black.

Measurments.—For measurements see tables, pages 109 and 110.

Specimens examined.—Total number 7, from the following localities:

ALASKA: Wrangell, 1 skin (U.S.N.M.).

BRITISH COLUMBIA: Massett, Queen Charlotte Islands, 3 alc. (U.S.N.M.); Telegraph Creek, 1 alc. (U.S.N.M.).

WASHINGTON: Lake Cushman (Mason County), 1 skin (U. M.); Sol Duc Hot Springs (Clallam County), 1 skin (U.S.N.M.).

Remarks.—In color the typical race of *Myotis keenii* appears to be not essentially different from *M. evotis evotis* and *M. lucifugus alascensis.* The longer ears serve to distinguish it readily from the coast race of *M. lucifugus*, and the smaller upper molars (crown of m^2 1.30 by 1.75 mm. in type, 1.35 by 1.60, and 1.30 by 1.75 mm., respectively, in two topotypes) are diagnostic as compared with the local form of *M. evotis* (crown of m^2 usually about 1.45 to 1.50 by 1.95 to 2.00 mm.).

MYOTIS KEENII SEPTENTRIONALIS (Trouessart)

Vespertilio subulatus H. ALLEN, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 51, figs. 45–46, June, 1864 (not of Say, 1823, or LeConte, 1855).—DOBSON, Catal. Chiroptera Brit. Mus., p. 324, 1878.—TRUE, Proc. U. S. Nat. Mus., vol. 7 (1884), p. 603, 1885.—MILLER, Proc. Boston Soc. Nat. Hist., vol. 28, p. 39, April, 1897.

Vespertilio gryphus lucifugus EVERMANN and BUTLER, Proc. Indiana Acad. Sci., 1893, p. 134, 1894.

Northern form of *Vespertilio gryphus* H. ALLEN, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 80, March 14, 1894.

Vespertilio gryphus var. *septentrionalis* TROUESSART, Catal. Mamm. viv. foss., p. 131, 1897.

Vespertilio gryphus septentrionalis MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 308, December 27, 1901.

Myotis subulatus MILLER, North Amer. Fauna, No. 13, p. 75, figs. 13*a*, 15*b*, October 16, 1897 (not of Say, 1823).—TROUESSART, Catal. Mamm. viv. foss., p. 1284, 1899.—MILLER, Prelim. List New York Mamm., Bull. New York State Mus., vol. 6, No. 29 (October, 1869), p. 366, November 18, 1899; Key Land Mamm. Northeastern North Amer., Bull. New York State Mus., vol. 8, No. 38 (October, 1900), p. 149, November 21, 1900.—ELLIOT, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45. zool. ser., vol. 2, p. 405, March 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 518, June, 1901.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 257, December 27, 1901.—ELLIOT, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 580, 1904.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 93, 1904.—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 478, 1905; Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 504, 1907.—G. M. ALLEN, Bull. Mus. Comp. Zool., vol. 52, p. 45, July, 1908.—HAHN, The Mamm. of Indiana, 33d Ann. Rep. Dept. Geol. and Nat. Resources of Indiana, 1908, p. 623, 1909.—CORY, Mamm. Illinois and Wisconsin, Field Mus. Nat. Hist., publ. 153, zool. ser., vol. 11, p. 460, 1912.—BAILEY, Proc. Biol. Soc. Washington, vol. 36, p. 137, March 28, 1923.

Myotis subulatus subulatus MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 58, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 72, April 29, 1924.—BAILEY, North Amer. Fauna, No. 49 [December, 1926], p. 216, January 8, 1927 (North Dakota).

Type locality.—Halifax, Nova Scotia.

Type specimen.—Harrison Allen[11] listed eight individuals of his "Var. (*b*) Northern form of *Vespertilio gryphus*" which served as the basis for Trouessart's name *septentrionalis.* As no less than five of these were from Nova Scotia one of the specimens taken by Doctor Gilpin at Halifax (No. $\frac{8188}{38663}$ U. S. Nat. Mus.) may appropriately be chosen as the lectotype.

Distribution.—Eastern North America from Newfoundland and Quebec south to Tennessee and South Carolina; west to North Dakota, Missouri, and Arkansas. (See map 6, p. 102.)

Characters.—Color approximately like that of *Myotis lucifugus lucifugus*, not darkened as in the typical northwest-coast rate; ears brown.

Color.—The color is not essentially different from that of *M. lucifugus lucifugus* in the bronzy phase, but the brown hair tips are neither so long nor so glossy. Consequently series of skins of the two species from the same region have an obviously unlike appearance due in part to the slight difference in color and in part to the less complete covering over of the slaty under fur in *M. keenii septentrionalis.*

Measurements.—For measurements see tables, pages 109 and 110.

Specimens examined.—Total number 169, from the following localities:

ARKANSAS: 2 alc. (M. C. Z.); Delight, 1 skin (U.S.N.M.).

CONNECTICUT: Mount Carmel, 1 alc. (M. C. Z.); New Haven, 1 alc. (U.S.N.M.).

DISTRICT OF COLUMBIA: Washington, 2 skins, 1 alc. (U.S.N.M.).

GEORGIA: Young Harris, 1 skin (U.S.N.M.).

ILLINOIS: Chicago, 1 alc. (U.S.N.M.); Wabash County, 1 alc. (U.S.N.M.).

INDIANA: Mitchell, 4 skins (U.S.N.M.); Terre Haute, 1 alc. (U.S.N.M.); Wheatland, 1 alc. (U.S.N.M.).

KENTUCKY: Burchette's Cave, 2 alc. (M. C. Z.); Eubanks, 2 alc. (U.S.N.M.).

LAKE SUPERIOR: 3 alc. (M. C. Z.).

MAINE: Eastport, 2 alc. (U.S.N.M.), 2 alc. (M. C. Z.); Norway, 1 alc. (M. C. Z.); St. George, 1 skin (M. C. Z.).

MARYLAND: Cabin John Bridge, 1 skin (U.S.N.M.); Muirkirk, 1 alc. (U.S.N.M.); Plummer Island, 5 skins (U.S.N.M.).

MASSACHUSETTS: Brookline, 1 alc. (M. C. Z.); Feltonville, 5 alc. (M. C. Z.); Harvard, 1 skin (M. C. Z.); Shirley, 1 skin (M. C. Z.); Springfield, 1 alc. (M. C. Z.); Ware, 1 alc. (M. C. Z.); Wilmington, 1 skin (U.S.N.M.).

MICHIGAN: Boynes Falls (Charlevoix County), 1 alc. (U. M.); Chippewa County, 2 alc. (U. M.); Detroit, 1 alc. (A. N. S. P.); Douglas Lake (Cheboygan County), 1 skin (U. M.); Isle Royal, 3 skins (U. M.); Macinac Island, 3 skins (B. M.); Porcupine Mountains (Ontonagon County), 3 skins (U. M.); South Lyon (Oakland County), 1 alc. (U. M.).

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[11] Monogr. Bats North Amer. (1893), p. 81, Mar. 14, 1894.

MINNESOTA: Elk River, 2 skins (U.S.N.M.).

MISSOURI: Marble Cave, 5 alc. (U.S.N.M.); Upper Missouri River, 1 skin, 1 alc. (U.S.N.M.).

NEW BRUNSWICK: Grand Manan, 3 alc. (M. C. Z.); no exact locality, 1 skin (B. M.).

NEWFOUNDLAND: Lewis Hills, 2 skins (M. C. Z.); Romain's Brook, 1 skin (M. C. Z.); Spruce Brook, 1 skin (M. C. Z.).

NEW HAMPSHIRE: Bethlehem, 2 alc. (M. C. Z.).

NEW YORK: Berkshire, 2 alc. (M. C. Z.); Fallsburg, 1 alc. (M. C. Z.); Hammondville, 12 alc. (U.S.N.M.); Hemlock Lake, 1 alc. (U.S.N.M.); Highland Falls, 1 skin (A. M. N. H.); Lake George, 4 alc. (U.S.N.M.); Long Island, 1 alc. (A. M. N. H.); Peterboro, 1 skin (U.S.N.M.); Stamford, 1 skin (A. M. N. H.).

NORTH CAROLINA: Cherokee, 1 alc. (U.S.N.M.).

NORTH DAKOTA: Fort Buford, 1 skin (U.S.N.M.); Fort Union, 1 alc. (U.S.N.M.).

NOVA SCOTIA: Annapolis, 1 alc. (U.S.N.M.); Halifax, 2 alc. (U.S.N.M.).

OHIO: Port Clinton, 1 alc. (U.S.N.M.).

ONTARIO: Casselman, 2 alc. (U.S.N.M.); Lake of Bays, 2 skins (U.S.N.M.); Malden, 1 skin (B. M.); Michipicoten, 1 skin (U.S.N.M.); Ottawa, 1 alc. (U.S.N.M.); St. Catherine's, 1 alc. (U.S.N.M.).

PENNSYLVANIA: Bradford, 1 alc. (U.S.N.M.); Center County, 1 skin (U.S.N.M.); Chester County, 1 alc. (A. N. S. P.); Markleton, Somerset County, 6 skins (U.S.N.M.); 1 alc. (B. M.); Round Island, Clinton County, 1 alc. (A. N. S. P.); Somerset County, 3 alc. (U.S.N.M.); Walnut Hill, Montgomery County, 2 alc. (A. N. S. P.).

QUEBEC: Anticosti Island, 1 alc. (M. C. Z.), 1 alc. (U.S.N.M.); Godbout, 5 alc. (U.S.N.M.); Lake Edward, 1 alc. (M. C. Z.).

SOUTH DAKOTA: Elk Mountain, 1 alc. (U.S.N.M.).

TENNESSEE: Bellamy's Cave, 3 alc. (U.S.N.M.); Hickman County, 2 skins (A. M. N. H.).

UNITED STATES: (no exact locality) 1 skin (U.S.N.M.).

VERMONT: North Hartland, 1 skin (A. M. N. H.); Proctor, 2 skins (U.S.N.M.); Weathersfield, 2 skins (M. C. Z.).

VIRGINIA: Alexandria, 1 alc. (U.S.N.M.); Dismal Swamp, 1 alc. (U.S.N.M.); Endless Cavern, 1 skin (U.S.N.M.); Luray, 1 skin (U.S.N.M.); Orkney Springs, 1 skin, 1 alc. (U.S.N.M.).

WEST VIRGINIA: Aurora, 2 alc. (U.S.N.M.); Braxton County, 1 skin (B. M.).

WISCONSIN: Bayfield, 1 alc. (U.S.N.M.); Sumpter, 1 skin (F. M.); Gotham, 1 alc. (U.S.N.M.).

Remarks.—Harrison Allen applied Say's name *Vespertilio subulatus* to the eastern long-eared *Myotis* in 1864. He was followed without question by Dobson in 1878. When writing the second edition of his Monograph (1894) Allen, no longer regarding the animal as specifically distinct from *Myotis lucifugus*, united it and *M. lucifugus* as "varieties" of a bat which he called *Vespertilio gryphus*. These he designated respectively as "Northern form of *Vespertilio gryphus*" and "*Vespertilio gryphus lucifugus*." In order to enter the supposed races in his Catalogus (1897) Trouessart Latinized the " Northern form " as " *Vespertilio gryphus septentrionalis*," wrongly attributing to Allen the new name which he thus established. Later in the same year, Miller, again recognizing the animal as a distinct species, restored the specific name *subulatus*, but called attention to the fact that, while there was no doubt as to the identity of the bat which Harrison Allen had in hand in 1864, the contrary was true with regard to the one originally named by Say in 1823. After quoting Say's description in full Miller says (1897, p. 36) :

> While there is nothing in this account that refers unquestionably to the longer eared of the two species of *Myotis* inhabiting the eastern United States, the name has passed current for this animal so long that, after careful consideration of all the evidence, I am unwilling to substitute for it Trouessart's name *septentrionalis*, the only one unequivocally based on the species. Say's *Vespertilio subulatus* came from the Arkansas River, near the present town of La Junta, Colorado. The bats of this region are not well known, but at present *Myotis evotis*, *M. californicus ciliolabrum*, and *M. lucifugus longicrus* are the only members of the genus *Myotis* which may confidently be expected to occur there. From the known range of *Myotis subulatus* to the north and west, however, its regular occurrence in Colorado is by no means impossible. * * * I am merely continuing the usage of the past thirty-four years, not, however, without grave misgivings that the reasons for so doing are in reality unsound.

Miller supposed that the eastern long-eared *Myotis* might occur in southeastern Colorado. It is still possible that such is the case; but thirty years of collecting since his paper was published have failed to prove that the animal's range extends nearer to the type locality of *Vespertilio subulatus* than Arkansas, Missouri, and North Dakota. Furthermore it can easily be shown that Say's description contains statements which are not applicable to this animal but which distinctly indicate a species whose range is known to include eastern Colorado, namely the small bat described as *Vespertilio ciliolabrum* by Merriam in 1886. The eastern long-eared *Myotis* is a definitely brown animal, somewhat lighter and more yellowish below than on the back; Say's bat was " dull cinereous " above and " yellowish-white " below. These expressions do not apply to the *subulatus* of Harrison Allen and subsequent authors, but they might readily have been based on specimens of " *ciliolabrum* " and notably on an individual from Colorado Springs which Warren recorded in 1910.[12] By a curious accident Warren misidentified his specimen as an example of the eastern long-eared *Myotis*. Consequently he called it *Myotis subulatus*, thinking that he had the *subulatus* of Harrison Allen, Dobson, and Miller. Actually he had Say's original *subulatus*, the animal to which we now restore this long-misapplied name. Trouessart's name *septentrionalis* therefore becomes available for the eastern bat which is now generally known as *Myotis subulatus*, but in the form *Myotis keenii septentrionalis*, Merriam having described the northwest-coast race of the species as *Vespertilio subulatus kennii* two years before Trouessart Latinized Harrison Allen's vernacular term.

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[12] Mammals of Colorado, p. 275.

External measurements of Myotis keenii

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis keenii keenii													
Alaska: Wrangell	187394	----	49.6	31.0	15.0	9.0	37.4	6.0	33.2	32.0	-----	-----	-----
Queen Charlotte Islands:													
Massett	[1] 12922	♀	43.4	42.2	17.4	8.2	36.6	7.0	32.6	31.4	17.4	13.4	10.0
Do	78070	♀	40.4	39.0	16.2	8.0	35.4	6.6	32.0	32.0	17.0	14.2	10.0
Do	78072	♂	44.2	37.0	17.0	8.4	35.8	7.0	32.4	31.8	17.4	13.8	10.6
British Columbia: Telegraph Creek	209856	♀	43.0	40.2	15.6	8.0	37.0	7.2	33.8	33.0	18.6	15.4	11.0
Washington:													
Sol Duc Hot Springs	242141	♂	55.0	34.0	16.0	8.4	36.4	6.8	33.4	31.8	-----	-----	-----
Lake Cushman	52920 U. M.	----	51.0	36.0	17.0	7.4	35.6	7.0	31.4	30.6	14.6	15.0	8.0
Myotis keenii septentrionalis													
Nova Scotia:													
Annapolis	151153	♂	46.2	39.4	18.8	8.2	38.8	6.4	34.8	34.0	16.0	13.6	10.8
Halifax	[2] 8188	♀	44.6	40.8	18.8	9.4	37.8	8.8	33.8	32.8	16.8	13.2	10.2
Quebec: Godbout	99186	♂	40.6	37.0	16.6	9.0	35.2	8.0	31.8	30.8	16.4	13.2	8.8
Ontario:													
Ottawa	187855	♀	46.4	40.8	17.8	8.4	36.6	7.2	34.0	33.2	16.6	15.0	10.4
Do	187856	♀	47.0	37.4	15.6	8.0	35.4	7.4	32.0	31.4	16.4	13.6	10.0
Do	187857	♂	44.0	39.2	17.0	8.8	35.8	7.2	32.0	31.4	16.4	13.4	10.2
Do	187858	♂	47.0	31.2	15.0	8.4	34.6	7.4	31.0	30.0	14.2	12.8	11.4
St. Catherine's	7253	♂	43.4	41.0	17.4	8.8	37.4	7.4	33.4	33.2	16.8	13.4	10.4
Maine:													
Eastport	144507	♂	46.0	41.6	18.0	9.0	38.0	6.8	34.0	33.0	16.2	13.0	10.2
Do	144508	♂	47.0	41.2	17.8	9.2	37.0	8.4	32.0	32.4	16.0	14.0	11.0
New York:													
Hammondville	187410	♂	43.4	41.8	17.4	8.6	37.6	7.0	34.0	34.0	15.0	12.0	10.0
Do	187411	♂	43.0	37.0	17.2	7.4	36.0	6.8	33.0	33.0	15.0	12.4	8.8
Do	187412	♀	43.8	42.0	17.4	8.0	38.0	6.8	35.0	35.0	16.6	12.2	10.0
Do	187414	♂	43.2	40.0	17.4	7.2	36.6	6.4	32.4	32.0	15.0	11.4	10.4
Do	187415	♀	44.8	38.6	17.4	8.0	37.2	7.4	34.4	33.2	15.2	13.8	10.0
Do	187416	♂	46.4	40.0	16.8	8.0	35.4	6.4	31.6	31.0	16.0	13.8	10.8
Lake George	24157	♀	46.0	42.6	16.4	8.6	37.0	7.0	33.0	32.8	15.0	13.4	9.4
Do	72174	♂	47.6	38.0	17.0	8.2	34.6	7.2	30.6	30.6	15.6	14.6	9.4
Maryland: Muirkirk	114662	♀	46.2	41.6	16.0	8.8	35.8	7.0	32.2	31.8	16.2	13.4	10.0
Virginia:													
Alexandria	14994	♀	43.8	36.4	16.6	8.4	35.4	7.2	31.8	31.2	16.4	12.4	9.6
Dismal Swamp	82176	♂	45.2	35.2	17.0	7.8	36.2	7.0	32.0	32.4	17.0	14.4	10.6
District of Columbia: Washington	239654	♀	45.6	37.0	16.4	8.6	34.6	6.6	32.0	31.2	16.2	14.2	9.4
North Carolina: Cherokee	23277	♀	45.4	43.0	17.4	8.0	37.2	7.0	33.6	32.6	15.6	13.4	9.8
Kentucky: Eubanks	187428	♀	44.0	39.0	16.8	7.6	36.4	7.0	33.0	32.8	16.4	12.8	9.0
Ohio: Port Clinton	201344	♂	44.6	37.4	17.0	8.2	35.4	6.2	33.0	33.8	15.0	14.0	10.4
Tennessee:													
Bellamy's Cave	52936	♂	43.8	36.8	16.8	8.4	34.6	7.0	31.8	31.2	15.8	15.0	10.0
Do	52938	♂	47.0	38.4	16.8	8.8	36.2	6.2	31.4	30.6	16.0	14.6	10.0
Indiana: Terre Haute	85468	♂	45.4	36.4	16.4	8.6	35.0	6.8	33.0	32.0	16.0	13.4	10.4
Illinois:													
Chicago	8175	♀	45.4	41.4	18.0	8.8	37.6	7.0	33.6	33.4	17.2	15.0	10.4
Wabash County	154179	♀	44.8	42.0	17.8	8.4	37.0	8.6	33.0	33.0	16.2	14.6	9.6
Wisconsin: Bayfield	11320	♀	44.6	42.2	17.2	8.8	36.2	7.0	32.8	32.0	16.0	14.0	10.2
Missouri:													
Marble Cave	53019	♀	43.4	42.2	17.0	8.2	35.8	7.6	33.0	32.0	16.2	12.0	9.8
Do	53020	♀	41.8	37.4	17.0	8.4	36.0	7.0	33.2	32.0	15.0	13.0	10.0
Do	53021	♀	44.8	39.2	16.8	9.0	37.0	8.0	33.4	33.0	15.4	14.0	9.6
Do	53022	♀	45.0	37.6	16.8	8.8	37.0	7.0	33.2	33.0	17.2	15.2	10.0
Do	53029	♀	44.8	35.6	16.0	8.0	36.0	6.4	33.6	32.0	16.0	12.4	9.2

[1] Type.

[2] Lectotype.

Cranial measurements of Myotis keenii

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis keenii keenii													
Alaska: Wrangell	187394	----	-----	-----	----	----	----	----	-----	5.6	5.4	----	0
British Columbia:													
Massett	[1] 72922	♀	14.6	13.8	8.2	3.6	7.0	5.0	10.5	5.6	5.5	6.0	0
Do	78070	♀	14.6	13.6	8.2	3.8	7.0	5.0	10.4	5.8	5.6	6.2	0
Do	78072	♂	-----	-----	----	3.8	----	----	10.4	5.6	5.6	6.0	0
Washington:													
Lake Cushman	52920 U. M.	♀	14.8	14.0	8.6	3.8	7.0	5.0	10.6	5.8	5.6	6.0	0
Sol Duc Hot Springs	242141	♂	-----	-----	----	3.6	----	----	-----	5.8	5.6	----	0
Myotis keenii septentrionalis													
Nova Scotia: Halifax	[2] 38663	♀	14.6	14.0	----	3.8	6.8	5.0	10.2	6.0	5.6	6.2	0
Quebec:													
Godbout	187858	♂	14.6	13.4	8.8	3.6	7.4	5.0	10.4	5.6	5.4	6.0	1
Anticosti	113412	♂	-----	14.0	----	3.6	----	----	10.6	5.8	5.3	6.0	0
Ontario:													
Casselman	187857	♂	15.0	14.0	8.8	3.6	7.4	5.0	10.6	6.0	5.7	6.2	0
Do	187856	♀	15.3	14.2	8.6	3.6	7.4	5.0	11.0	6.0	5.6	6.2	1
St. Catherine's	38662	♂	15.0	14.0	8.8	3.6	7.2	5.2	10.8	6.0	5.7	6.2	0
Lake of Bays	174542	♀	15.0	14.2	9.0	3.6	7.2	5.2	-----	5.8	5.6	----	0
Maine:													
Eastport	144507	♂	15.2	14.0	----	----	7.0	5.0	10.6	6.0	5.7	6.4	0
Do	144508	♂	15.1	14.0	9.0	3.6	7.2	5.0	10.8	5.8	5.7	6.2	0
Vermont: Proctor	205960	♂	15.4	14.0	8.6	3.6	7.2	5.0	10.6	5.8	5.7	6.4	1
Massachusetts: Wilmington	96957	♂	15.5	14.0	9.0	3.4	7.2	5.0	10.6	6.0	5.4	6.6	0
Connecticut: New Haven	187854	♀	15.2	14.4	9.0	3.6	7.0	5.0	10.8	5.8	5.7	6.2	1
New York:													
Hammondville	187416	♂	15.2	14.2	8.6	3.6	7.6	5.0	10.8	6.0	6.0	6.2	0
Do	187417	♂	-----	14.6	9.0	3.8	7.4	5.0	11.2	6.0	5.5	6.4	0
Do	187418	♂	-----	14.2	----	3.6	7.6	----	11.2	6.0	5.8	6.4	1
Do	187419	♀	15.2	14.2	----	3.6	7.2	5.0	11.0	6.0	5.7	6.2	0
Do	187420	♀	15.3	14.8	9.0	3.6	7.6	5.0	11.2	6.0	5.7	6.2	0
Peterboro	140765	♂	15.4	14.4	9.0	3.8	7.4	5.0	11.2	6.0	5.7	6.2	0
Pennsylvania:													
Markleton	84885	♂	15.6	14.2	8.8	3.4	7.0	5.0	11.0	6.0	5.8	6.2	0
Do	84887	♂	14.8	14.0	8.8	3.4	7.0	5.0	10.4	5.6	5.6	6.0	0
Do	84888	♀	14.9	13.8	9.0	3.4	7.0	4.6	11.0	5.8	5.7	6.2	1
Do	84892	♀	14.9	14.0	8.8	3.6	7.0	5.0	10.4	5.8	5.2	6.0	1
Do	84895	♀	15.5	14.4	8.4	3.6	----	5.2	11.0	6.0	5.7	6.4	0
Maryland:													
Cabin John	117109	♂	-----	-----	9.0	3.6	7.2	----	10.6	5.8	5.7	6.0	0
Plummer Island	150277	♂	14.9	13.8	9.0	3.6	7.2	5.0	10.4	5.8	5.8	6.2	2
Do	156914	♂	15.1	13.8	9.0	3.6	7.0	5.0	10.4	5.8	5.7	6.2	0
Do	167977	♂	15.3	13.8	9.0	3.6	7.0	5.0	10.6	6.0	5.7	6.2	1
Do	150276	♀	15.1	14.0	9.2	3.4	7.0	4.6	11.0	5.8	5.7	6.4	0
Muirkirk	114662	♀	14.8	14.0	----	3.6	----	----	10.8	5.8	----	6.2	0
Virginia:													
Alexandria	38672	♀	15.2	13.8	----	3.6	7.2	4.8	11.0	6.0	5.7	6.2	0
Luray	102072	♂	15.4	14.0	9.0	3.8	7.2	5.0	11.0	6.0	5.7	6.4	0
West Virginia: Aurora	187426	♀	15.1	14.0	9.0	3.8	7.2	5.0	10.8	6.0	5.8	6.2	0
Kentucky:													
Eubanks	187424	♂	14.9	13.8	8.4	3.6	7.0	4.8	10.4	6.0	5.5	6.2	0
Do	187428	♀	15.0	14.2	----	3.6	7.2	5.0	10.6	5.8	5.7	6.0	0
Tennessee: Marion County	113998	♂	-----	14.8	----	4.0	7.4	5.8	11.4	6.0	----	6.6	0
Indiana:													
Mitchell	153637	♂	15.3	14.2	9.2	3.6	7.2	5.0	11.0	6.0	5.6	6.2	1
Do	153638	♂	-----	14.0	----	4.0	7.2	5.4	11.2	5.8	----	6.2	2
Do	153635	♂	-----	13.8	9.0	4.0	7.2	6.0	10.4	5.4	----	6.0	3
Do	153639	♂	-----	13.8	9.0	3.8	7.2	5.6	10.8	5.4	----	6.0	1
Do	153640	♂	15.2	14.2	9.2	4.0	7.2	5.0	11.0	6.0	5.9	6.6	1
Do	153636	♀	15.5	14.0	9.6	3.8	7.4	5.2	11.2	6.0	5.9	6.4	2
Terre Haute	85468	♂	15.0	14.0	----	3.6	7.4	5.0	10.6	6.0	5.6	6.2	0
Wheatland	38674	----	15.0	14.0	8.8	3.6	7.2	5.0	11.0	6.0	5.5	6.2	0
Wisconsin: Sumpter	20387 F. M.	♂	15.5	-----	----	3.6	7.2	----	11.0	6.0	5.7	6.4	2
Missouri:													
Marble Cave	53019	♀	15.0	13.8	9.2	3.6	7.2	5.0	10.6	6.0	5.7	6.4	1
Do	53020	♀	15.0	14.0	9.2	3.8	7.2	5.0	10.8	6.0	5.7	6.2	1
Do	53029	♀	15.4	14.0	9.0	3.8	7.4	5.0	11.0	6.0	5.5	6.4	1
Arkansas: Delight	170476	♂	15.0	14.0	9.0	3.6	7.0	5.0	10.4	5.6	5.5	6.0	1
Minnesota: Elk River	187423	♂	15.2	15.0	----	3.6	7.4	5.0	11.4	6.0	6.0	6.4	0
Upper Missouri River	38668	♂	15.3	14.2	----	3.8	7.2	5.0	11.0	5.8	5.8	6.2	0

[1] Type.

[2] Lectotype.

MYOTIS EVOTIS (H. Allen)

(Synonymy under subspecies)

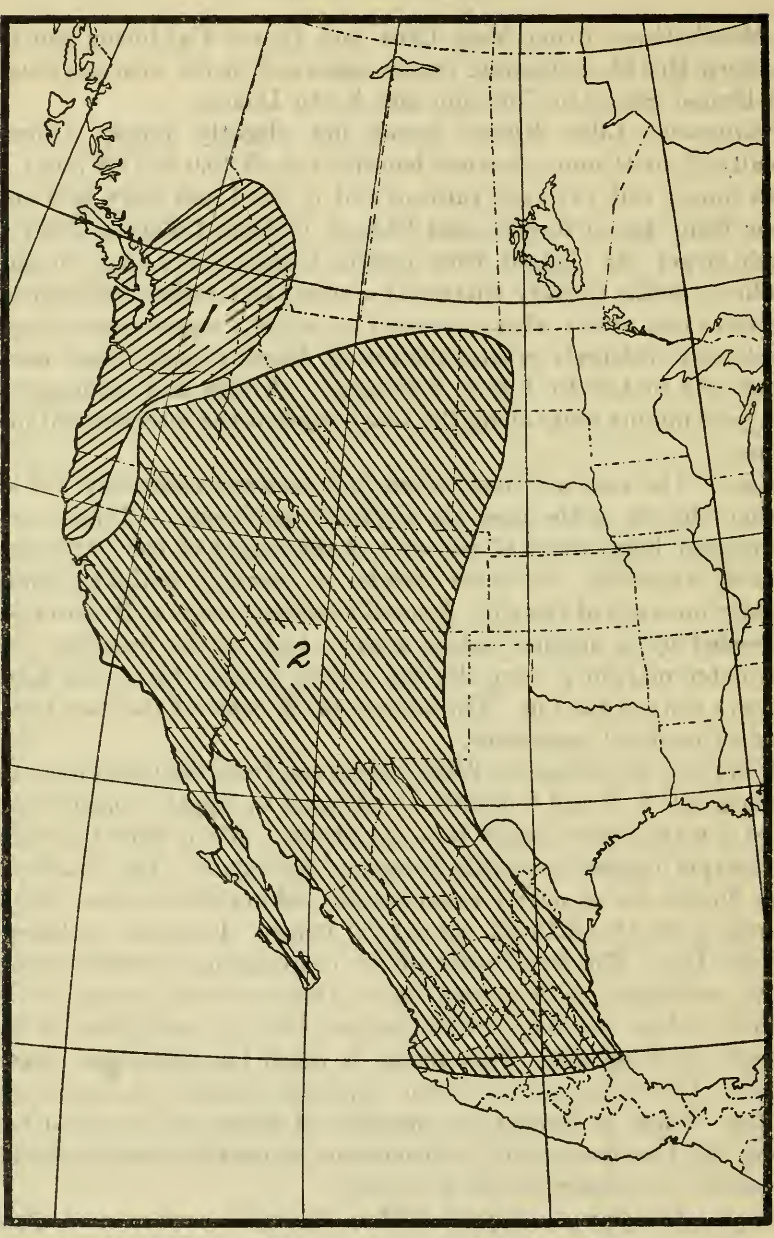
Distribution.—From Vera Cruz and Lower California north to southern British Columbia, thence eastward in the arid portions of the United States to Colorado and North Dakota.

Diagnosis.—Like *Myotis keenii* but slightly larger (forearm usually 37 to 41 mm.; greatest length of skull 15.0 to 16.4 mm.) and with longer tail (average ratio of tail to head and body in 4 specimens from the northwest coast 90.3, in 10 from Colorado 96.9) and much larger ear (height from meatus usually more than 20 mm.). Auditory bullæ slightly enlarged; a small and rather inconspicuous sagittal crest nearly always present in adults; crown area of upper cheek teeth distinctly greater than in *M. keenii* (crown of m^2 usually about 1.45 to 1.50 by 1.95 to 2.00 mm.). A thin and inconspicuous fringe of minute hairs along the free border of the interfemoral membrane.

Ears.—The ears are long, when laid forward extending 5–7 mm. beyond the tip of the nose (in alcoholic specimens). Tragus correspondingly long, about 47 per cent of the height of ear (9:19 mm.), slender, tapering; its inner border is nearly straight, bending slightly outward at the tip. A small rounded lobe is at its outer base, succeeded by a distinct notch, above which is the broadest point. The outer margin is very slightly convex basally then very faintly concave toward the top. The intense black color of the ears usually persists in dried specimens.

Wing and membranes.—Wing membrane from the base of the toes. Metacarpals 3, 4, and 5 usually about equal in length; sometimes the third is a very little longer than the others. When folded, the third metacarpal reaches to within 2 mm. of the elbow. The fourth and fifth fingers are of nearly equal length; taking the third as 100, the fourth is 83, the fifth 82 (61:51:50 mm.). Terminal vertebra of the tail free. The free border of the uropatagium is thinly fringed above and below with minute hairs; these are usually not obvious without a lens, yet they project beyond the edge and grow in little clusters of from 2–4. This fringe is much less developed than in *Myotis thysanodes*, yet it is often perfectly definite; and even when no true fringe is formed the presence of numerous scattered hairs along the free border of the membrane is usually characteristic of *M. evotis* as compared with *M. keenii.*

Foot.—The foot is proportioned to the tibia nearly as in *Myotis keenii;* that is, it is usually somewhat less than half as long as the tibia, but is not infrequently more than half as long. In 10 specimens from the northwest-coast region the ratio of foot to tibia averages



MAP 7.—DISTRIBUTION OF MYOTIS EVOTIS: 1, M. EVOTIS EVOTIS; 2, M. EVOTIS CHRYSONOTUS

49.5; in 10 from Colorado it averages 48.3. Calcar long, ending in a minute lobule, sometimes with a rudimentary keel.

Fur and color.—The pelage is full and soft, the individual hairs about 10 mm. long on middle of back. General color a light brown, varying in the subspecies. Membranes and ears usually contrasted brownish black.

Skull.—The skull (pl. 1, p. 7, fig. 7) is essentially identical with that of *Myotis keenii* except that it is slightly larger, the auditory bullæ are a little more inflated, and the sagittal crest is more constantly developed (though rarely very conspicuous). Upper profile curving very gradually from rostrum to summit of skull. Adults show a low but evident sagittal crest, most obvious where it crosses the depression just in advance of the occiput. Lambdoid ridges low but evident, meeting at the occiput when fully developed. Viewed from above the brain case is oval, bulging posteriorly beyond the lambdoid ridges. The length of the maxillary tooth row, as in *Myotis keenii*, equals or slightly exceeds the palatal width including the molars.

Teeth.—In general the teeth resemble those of *Myotis keenii*, but the upper molars show a stronger tendency to reduction of the secondary cusps and ridges; their crown area is obviously greater, the crown of m^2 usually about 1.45 to 1.50 by 1.95 to 2.00 mm. instead of 1.25 to 1.35 by 1.60 to 1.75 mm. The protoconule is always low and sometimes practically absent; the metaloph is rudimentary, often eliminated completely so as to leave a perfectly smooth valley between the bases of the protocone and metacone. Protocone and hypocone more robust than in *M. keenii*, rarely if ever shrinking away from the margin of the crown sufficiently to permit the cingulum to pass uninterruptedly around the base of the protocone. The small upper premolars are seldom crowded but stand either directly in the tooth row or very slightly drawn in.

Remarks.—Among the American members of the genus, *Myotis evotis* is readily distinguishable by its moderate size combined with its greatly enlarged ears. Usually the ears, in well-prepared skins, are black in sharp contrast with the rather pale general color of the fur, a feature which when present, renders them doubly conspicuous.

While obviously related to *Myotis keenii* this animal shows a higher degree of specialization in the more enlarged ears and auditory bullæ, and in the more pronounced tendency to reduction of the secondary cusps and ridges of the first and second upper molars.

The series of skins available for study is not very extensive, as *Myotis evotis* appears to be nowhere a common bat. So far as it goes the material indicates that the species is divisible into two rather ill-defined geographical races, a darker typical form confined to the humid northwest-coast region and a lighter form occupying the rest of the animal's range. That all of the lighter individuals represent a single geographical race appears to be highly improbable, but the material now at hand is not sufficient to form the basis for any satisfactory subdividing.

Habits.—The long-eared bat occurs over a wide area chiefly west of the Rocky Mountains in the United States, and apparently more in the thinly forested country than in wooded sections. Judging from specimens in collections, it is unusual to find them except as scattered individuals. Cary (1911), however, obtained a series of adult and immature examples, in August, 1906, from a deserted ranch house near Sunny Peak, Routt County, Colo. At other places in the same State, he secured additional specimens about ranch buildings but failed to find them about ledges or cliffs. Where buildings are not available this species probably finds shelter in crevices or perhaps in trees. At all events it seems not to be reported from caves. In Colorado, Young (1908) records it from an altitude of 7,000 feet.

MYOTIS EVOTIS EVOTIS (H. Allen)

Vespertilio evotis H. ALLEN, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 48, fig. 42–43, June, 1864.—DOBSON, Catal. Chiroptera Brit. Mus., p. 324, 1878.—TRUE, Proc. U. S. Nat. Mus., vol. 7 (1884), p. 602, 1885.—LYON and OSGOOD, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 290, January 28, 1909.

Vespertilio albescens evotis H. ALLEN, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 89, March 14, 1894.—TROUESSART, Catal. Mamm. viv. foss., p. 132, 1897.

Vespertilio nitidus evotis H. ALLEN, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), pl. 12 and explanation, March 14, 1894 (corrected in erratum slip).

Myotis evotis MILLER, North Amer. Fauna, No. 13, p. 77, October 16, 1897.—TROUESSART, Catal. Mamm. viv. foss., p. 1284, 1899.—ELLIOT, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 406, March, 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 518, June, 1901.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 258, December 27, 1901.—ELLIOT, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 574, 1904.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 94, 1904.—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 474, 1905.—LYON and OSGOOD, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 290, January 28, 1909.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 59, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 73, April 29, 1924.

Type locality.—Puget Sound.[13]

Type specimen.—The original description was based on 13 specimens: 3 from "Upper Missouri" (the identity of which is uncertain);

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[13] See H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), pp. 90–91. Mar. 14. 1894.

three from "Puget Sound"; 2 from east of Colville, Wash.; 1 from Monterey, Calif.; 2 from Cape St. Lucas, Lower California, Mexico; 1 from New Mexico; and 1 without locality. All are therefore cotypes, although some at least probably represent another species. In a subsequent paper, H. Allen (1894) described a specimen from Easton, Wash., as representing what he considered "typical *V. evotis* of the monograph" (1864). Easton lies about 55 miles inland from Puget Sound. We are informed by Mr. Vernon Bailey that the faunal aspect of the locality is such that the occurrence of the coast form or of an intermediate between the coast form and *chrysonotus* is to be anticipated. The specimens described by H. Allen can not now be determined as to subspecies.

Miller (1897), overlooking this definite statement of H. Allen, selected Monterey, Calif., as the type locality, whereby the specimen (which can not now be found in the National Museum) from that place became, according to Lyon and Osgood (1909), the lectotype. However, H. Allen's earlier (1894) action can only be interpreted as fixing the type locality in western Washington. He originally had three specimens from this region, all taken at "Puget Sound." One of these is still in the National Museum (No. 5391). A specimen labeled "Puget Sound" now in the collection of the Academy of Natural Sciences of Philadelphia (No. 1808) was received many years ago from the Smithsonian Institution and is probably another of H. Allen's cotypes.

Distribution.—Humid coast region from southern British Columbia and western Washington southward to northwestern California. (See map 7, p. 112.)

Intergradation with the subspecies *chrysonotus* characterized by its clearer, golden color takes place in northern California. A skin from Sisson, Siskiyou County, Calif. (No. 95454 U.S.N.M.), is practically indistinguishable in color from those taken in British Columbia east of the coast range. These are somewhat paler than those from the more saturate area near the seaboard and are more or less intermediate between the typical race and *M. evotis chrysonotus.*

Diagnosis.—General hue of upper parts dull, nearly the clay color of Ridgway (1912), without golden cast.

Color.—Color above, a uniform yellowish buff with a distinct olivaceous cast, nearly "clay color" (Ridgway, 1912), the tips of the hairs faintly glossy. A blackish-brown spot, usually rather ill defined, at the shoulder. Lower surfaces pale buffy. The bases of the hairs both above and below are plumbeous black. Ears blackish, membranes blackish brown.

In skins from Washington and British Columbia the dull yellow tips of the long hairs of the back seem shorter than in the southern race, so that the dark bases show through. The general effect is a slightly olivaceous and distinctly duller tint as compared with the bright golden brown of Californian specimens.

Immature specimens have the pelage thinner, the dorsal surface paler buff, and the ventral surface clearer whitish.

Measurements.—For measurements see tables, pages 120 and 121.

Specimens examined.—Total number 42, from the following localities:

ALBERTA: Jasper, 1 skin (A. M. N. H.), not typical.

BRITISH COLUMBIA: Cranbrook, 3 skins (C. B. Garrett); Rock Creek, 1 skin (B. M.); Shuswap, 2 skins (U.S.N.M.); Vernon, 1 skin (A.N.S.P.); Victoria, 1 alc. (A.N.S.P.).

CALIFORNIA: Beswick, Siskiyou County, 1 skin (U.S.N.M.); Mount Sanhedrin, Mendocino County, 2 skins (A.N.S.P.); Sisson, Siskiyou County, 1 skin (U.S.N.M.); South Yolla Bolly Mountain, 1 skin (U.S.N.M.); no exact locality, 1 skin (B. M.).

OREGON: Blaine, Tillamook County, 1 skin (Alex. Walker coll.); Buck Creek, 1 alc. (U.S.N.M.); Fremont, 1 skin (U.S.N.M.); McKenzie Bridge, Lane County, 1 skin (U.S.N.M.); Tillamook, Tillamook County, 1 skin (Alex. Walker coll.); Wallowa Lake, 1 alc. (U.S.N.M.).

WASHINGTON: Bartholomew, 4 skins (S. H. Lyman); Easton, 2 alc. (U.S.N.M.); Martin, 1 alc. (A.N.S.P.); Godman Springs, 9 skins (S. H. Lyman); Puget Sound, 2 alc. (B. M.), 1 alc., topotype (U.S.N.M.), 1 alc., topotype? (A.N.S.P.); South Touchet, 1 skin (S. H. Lyman.)

MYOTIS EVOTIS CHRYSONOTUS (J. A. Allen)

Vespertilio evotis H. ALLEN, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 48, fig. 42–43, June, 1864 (part).—COOPER, Proc. California Acad. Sci., vol. 4, p. 5, 1868.—J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 5, p. 202, August 18, 1893.—MERRIAM, North Amer. Fauna, No. 3, p. 46, September 11, 1890.—BRYANT, Zoe, vol. 1, p. 358, February, 1891.

Myotis evotis MILLER, North Amer. Fauna, No. 13, p. 77, October 16, 1897 (part).—MERRIAM, North Amer. Fauna, No. 16, p. 88, October 28, 1899.—ELLIOT, Field Columb. Mus., publ. 91, zool. ser., vol. 3, p. 320, March, 1904.—STONE, Proc. Acad. Nat. Sci. Philadelphia, (July, 1904), p. 579, October 17, 1904.—STEPHENS, California Mammals, p. 267, 1906.—ELLIOT, Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 501, 1907.—LYON and OSGOOD, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 290, January 28, 1909.—CARY, North Amer. Fauna, No. 33, p. 207, August 17, 1911 (part).—WARREN, Mammals of Colorado, p. 276, 1910.—J. GRINNELL, Proc. California Acad. Sci., ser. 4, vol. 3, p. 278, August 28, 1913.—BAILEY, North Amer. Fauna, No. 35, p. 33, September 5, 1913.—CARY, North Amer. Fauna, No. 42, p. 26, October 3, 1917.—H. W. GRINNELL, Univ. California Publ. Zool., vol. 17, p. 293, January 31, 1918.—BAILEY, North Amer. Fauna, No. 49 [December, 1926], p. 216, January 8, 1927 (North Dakota).

Vespertilio chrysonotus J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 8, p. 240, November 21, 1896.—MILLER, North Amer. Fauna, No. 13, p. 77, October 16, 1897 (in synonymy of *M. evotis*).—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 308, December 27, 1901.

Myotis micronyx Nelson and Goldman, Proc. Biol. Soc. Washington, vol. 22, p. 28, March 10, 1909 (Comondu, Lower California, Mexico).—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 59, December 31, 1912.—Elliot, Check-List Mamm. North Amer., suppl., p. 156, 1917.—Miller, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 73, April 29, 1924.

Type locality.—Kinney Ranch, Sweetwater County, Wyo.

Type specimen.—Adult female, skin only, No. 11645, American Museum of Natural History, collected at Kinney Ranch, Sweetwater County, Wyo., July 21, 1895, by W. W. Granger.

Distribution.—Range of the species except the humid northwest-coast region. (See map 7, p. 112.)

Diagnosis.—Color not darkened as in the typical race.

Color.—Similar to *Myotis evotis evotis*, but general color averaging paler; the tips of the hairs above tending to be golden or flaxen (pale buffy) those of the lower surfaces often nearly white, lacking the buffy wash of typical *evotis* from the northern Pacific coast.

Measurements.—For measurements see tables, pages 120 and 121.

Specimens examined.—Total number 80, from the following localities:

ARIZONA: Chiricahua Mountains, 1 skin (A. M. N. H.); Huachuca Mountains, 1 skin (F. M.); Paradise, Cochise County, 2 skins (U.S.N.M.); San Francisco Mountains, 1 alc., 2 skins (U.S.N.M.); Santa Catalina Mills, 1 skin (A. M. N. H.); Springerville, 1 skin (U.S.N.M.); Tucson, 1 skin (U.S.N.M.); White Mountains, Cooley's, 1 skin (A. M. N. H.); Williams, 1 alc. (U.S.N.M.).

CALIFORNIA: Belmont, 1 skin (A. N. S. P.); Dulzura, 2 alc. (A. N. S. P.), 1 skin, 2 alc. (A. M. N. H.); Inyo Mountains, 1 alc. (U. S. N. M.); Mount Tallac, 1 skin (M. C. Z.); Mount Whitney, 1 skin (F. M.); Owens Lake, 1 alc. (U.S.N.M.); San Bernardino Mountains, 1 skin (U.S.N.M.); San Joaquin River, 1 alc. (U.S.N.M.); San Rafael, 1 skin (B. M.); Twin Oaks, 1 alc. (U.S.N.M.).

CHIHUAHUA: San Luis Mountains, 1 skull (U.S.N.M.).

COLORADO: Ashbaugh's Ranch, Montezuma County, 1 skin, 1 alc. (U.S.N.M.); Coventry, 5 alc. (U.S.N.M.); Dolores, 1 alc. (U.S.N.M.); Loveland, 1 alc. (U.S.N.M.); Snake River, 6 skins, 3 alc., 1 skull (U.S.N.M.).

IDAHO: Albion, 2 skins (U.S.N.M.); Tamarack, 1 skin (U.S.N.M.).

JALISCO: Los Masos, 1 skin (A. M. N. H.).

LOWER CALIFORNIA: Comondu, 1 skin, type of *micronyx* (U.S.N.M.).

MONTANA: Big Belt Mountains, 4 miles south of Fort Logan, 1 skin (U.S.N.M.); Billings, 1 alc. (U.S.N.M.); Buffalo, 2 skins (U.S.N.M.); Highwood Mountains, 1 skin, approaching true *evotis* (U.S.N.M.); Hot Springs, 1 alc. (U.S.N.M.).

NEVADA: Cottonwood Range, 1 alc. (U.S.N.M.); Little Owyhee River, 1 skull (U.S.N.M.); Pahranagat Valley, 1 alc. (U.S.N.M.).

NEW MEXICO: Fort Wingate, 2 alc. (U.S.N.M.); Mimbres Mountains, 1 skin (U.S.N.M.); Sapello Canyon, San Miguel County, 10,000 feet, 1 alc. (A.N.S.P.); Vermejo River, 1 skin (U.S.N.M.); Fort Wingate, 2 alc. (U.S.N.M.), 1 alc. (B. M.).

NORTH DAKOTA: Grinnell, 1 skin (U.S.N.M.).

OREGON: Camp Harney, 1 alc. (U.S.N.M.); Cedar Mountains, Malheur County, 1 skin (U.S.N.M.); Cornucopia, Wallowa County, 1 skin (U.S.N.M.); Disaster Peak, Malheur County, 1 skin (U.S.N.M.); Sisters, Cross County, 1 skin (U.S.N.M.); Twelve Mile Creek, Crook County, 1 alc. (U.S.N.M.); Wallowa Lake, 1 alc. (U.S.N.M.).

SOUTH DAKOTA: Corral Draw, 1 alc. (A.M.N.H.).

VERA CRUZ: Perote, 7800 feet, 1 alc. (U.S.N.M.).

WYOMING: Buffalo Lake, 1 alc. (U.S.N.M.); Kinney Ranch, 1 skin, type (A. M. N. H.).

Remarks.—As noted by Miller (1897, p. 80), the type specimen of *Myotis evotis chrysonotus* has the tail injured so that its shortness in comparison with that of typical *Myotis evotis* can not be regarded as a valid character. Indeed the similarity of the type to Californian examples was pointed out by the original describer, who remarked that the animal would probably prove to be only a subspecies of *Myotis evotis*, a suggestion which is well borne out by the larger series now available. The lighter color as compared with the typical form seems to be the only diagnostic feature of the race. At present, however, it must be recognized that the status of the subspecies of *Myotis evotis* is far from satisfactory. Specimens from localities so far apart as Montana, Lower California, and Vera Cruz are not likely to represent one race; but the series of skins now available has not enabled us to come to any final conclusions, though it seems not improbable that the existence of a central and southern coast form (*micronyx*), an interior form (true *chrysonotus*), and a southern Mexican form will eventually be demonstrated.

In parts of western Colorado this bat appears to be less uncommon than usual. Cary (1911) observes that he has not found it about cliffs or ledges, the favorite resort of *Pipistrellus hesperus*, but usually in the vicinity of ranch buildings. Bats of this kind frequently fly into houses in pursuit of insects attracted by a light. Cary found a small colony, apparently of adult females and nearly full-grown young, inhabiting a deserted ranch house at Sunny Peak, Routt County, Colo., in August, 1906. Other than this there appear to be no recorded accounts of breeding colonies.

MYOTIS MILLERI Elliot

Myotis milleri Elliot, Field Columb. Mus., publ. 74, zool. ser., vol. 3, p. 172, April, 1903; Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 575, 1904; Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 474, 1905; Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 501, 1907.—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 59, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 73, April 29, 1924.

Type locality.—La Grulla, San Pedro Martir Mountains, Lower California, Mexico.

Type specimen.—Adult male (skin and skull), No. 10840, Field Museum of Natural History, collected at La Grulla, San Pedro Martir Mountains, Lower California, September 15, 1902, by Edmund Heller.

Distribution.—San Pedro Martir Mountains, Lower California, Mexico.

Diagnosis.—Externally resembling *Myotis evotis* but smaller, forearm 34 to 37 mm. instead of 36 to 40 mm., third finger 54 to 58 mm. instead of 62 to 67 mm., and tibia 16.0 to 17 mm. instead of 17 to 20 mm. Skull smaller than that of *Myotis evotis*, the brain case less elevated, noticeably flat-topped, the sagittal crest absent in each of the six specimens examined (nearly always present in adults of *M. evotis*). Teeth small, the crown area of the upper molars equal to that of the upper molars of *M. keenii* (crown area of m^1 in six specimens, 1.25 to 1.35 by 1.60 to 1.75).

Color.—The color does not differ appreciably from that of *Myotis evotis chrysonotus.*

Measurements.—For measurements see tables, pages 120 and 121.

Specimens examined.—Seven, all from the San Pedro Martir Mountains, Lower California, Mexico (2 skins, 1 skull, F.M., including type; 4 alc., A. M. N. H.).

Remarks.—The characters of *Myotis milleri* appear to be well marked and to indicate the existence, in the San Pedro Martir Mountains, of a distinct species related to *Myotis evotis* and *M. keenii.* The large conspicuously contrasted black ears and the distinctly fringed interfemoral membrane resemble *M. evotis.* The general dimensions and small teeth are essentially as in *M. keenii.* The flattened brain case gives the skull a form unlike that of either of the related species and somewhat intermediate between the forms characteristic of *Myotis keenii* and *M. subulatus.* The specimens of *Myotis milleri* differ conspicuously from the type of *Myotis micronyx* Nelson and Goldman (collected at Comondu) which has the high brain case and large teeth (m^2 1.45 by 1.95 mm.) characteristic of *Myotis evotis.*

External measurements of Myotis evotis and M. milleri

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis evotis evotis													
Washington:													
Puget Sound	[1] 5391	♀	43.0	39.0	16.8	9.6	37.2	6.0	32.8	32.8	19.0	17.0	10.0
Do	4.3.3.2 B. M.	♂	43.6	40.0	17.8	8.4	38.0	7.0	33.6	32.0	21.0	19.4	10.6
Oregon:													
Buck Creek	79309	♂	45.0	42.8	17.0	8.6	38.6	6.6	34.2	33.8	20.4	18.0	11.4
Wallowa Lake	91763	♀	43.0	40.0	16.8	8.4	37.4	7.2	33.6	32.0	19.8	17.2	11.0
Fremont	204908	♂	43.6	33.0	18.2	8.8	37.0	7.6	32.8	32.0	-----	-----	-----
McKenzie Bridge	204395	♂	47.6	34.0	18.2	9.0	37.6	6.6	32.2	31.2	-----	-----	-----
British Columbia:													
Cranbrook	51 Garrett	----	44.8	38.2	18.0	8.2	38.0	7.0	34.0	32.8	-----	-----	-----
Do	54	----	43.8	39.0	17.4	9.4	36.0	6.4	34.4	33.8	-----	-----	-----
Shuswap	67138	♀	54.0	37.2	18.2	8.2	38.0	6.8	34.8	33.0	-----	-----	-----
Do	187429	----	41.6	35.0	18.4	9.0	39.0	7.8	35.4	33.8	-----	-----	-----
Myotis evotis chrysonotus													
Montana:													
Billings	203950	♂	49.0	42.4	18.2	8.2	40.0	7.2	34.0	34.2	21.6	17.2	10.0
Nevada:													
Cottonwood Range	80910	----	46.2	40.0	17.8	8.2	37.6	7.0	34.0	32.6	19.2	18.0	11.0
Pahranagat Valley	28934	♀	42.0	41.0	18.0	8.0	37.2	7.2	34.4	32.8	20.6	18.6	11.6
Wyoming: Buffalo Lake	55846	♂	44.2	32.0	17.6	8.0	37.4	7.2	35.0	33.6	19.0	17.4	10.4
Oregon: Twelve Mile Creek	79307	♀	43.0	42.2	18.4	9.0	39.0	7.8	34.6	34.0	20.0	18.2	11.8
Colorado:													
Ashbaugh's Ranch	151159	♀	45.4	40.0	19.6	9.0	40.8	7.2	35.8	35.6	21.2	19.0	12.4
Coventry	151160	♀	47.5	47.0	18.0	9.2	39.4	7.6	35.2	34.2	21.2	20.0	11.2
Do	151161	♀	42.0	43.8	17.8	9.0	39.0	7.0	35.0	34.2	21.2	20.0	12.8
Do	151162	♀	45.0	44.8	19.0	8.4	42.2	7.4	36.8	35.6	22.0	18.8	12.2
Dolores	151158	♀	48.0	48.0	18.6	9.8	41.0	8.0	36.4	36.0	21.8	20.0	11.4
Loveland	22237	♂	47.0	42.8	18.0	8.0	39.0	6.0	35.0	34.0	21.0	17.0	11.2
Snake River	147771	♀	45.0	44.8	18.8	9.6	39.2	7.6	34.8	33.8	22.0	18.2	13.0
Do	147772	♀	41.8	40.4	19.2	8.2	38.0	7.8	34.2	33.6	22.0	19.6	11.4
Do	147773	♀	42.4	41.4	17.8	9.0	37.6	7.0	34.2	33.4	21.6	20.0	11.8
Arizona:													
San Francisco Mtn	18683	♂	44.4	41.2	18.4	8.0	40.2	7.6	37.0	35.8	21.2	17.0	11.0
Williams	112015	♂	44.6	39.8	18.0	8.0	39.0	7.2	34.8	33.8	22.0	19.8	12.0
New Mexico:													
Fort Wingate	199717	♂	49.0	39.4	18.4	8.8	38.4	7.2	35.6	35.0	22.4	18.8	11.8
Do	199718	♀	48.0	46.0	18.8	8.2	40.0	7.8	36.2	35.2	22.0	19.2	13.0
California:													
Inyo Mountains	29090	♂	42.6	44.0	19.8	7.4	39.0	7.4	35.0	34.2	22.2	21.0	12.2
Owens Lake	28958	♀	47.2	42.6	17.4	8.0	39.0	7.0	36.2	34.8	21.6	19.8	11.4
San Joaquin River	30305	♂	44.6	44.6	18.6	9.0	38.8	7.0	35.0	34.6	22.4	19.0	13.0
Twin Oaks	52802	♀	49.6	42.8	19.0	8.6	38.4	7.0	34.2	33.2	21.6	18.4	12.0
Lower California:													
Comondu	[2] 146044	♂	"48"	"42"	17.4	9.0	36.0	6.0	33.2	32.0	-----	-----	-----
Vera Cruz: Perote	88541	♂	49.0	42.0	20.0	9.0	40.4	7.0	37.6	37.0	18.0	16.0	10.0
Myotis milleri													
Lower California:													
San Pedro Martir	6423 A.M.N.H.	♀	43.8	41.0	17.0	9.0	37.0	5.8	33.4	-----	20.0	16.6	10.8
Do	6424	♀	41.2	38.0	17.0	8.2	35.4	6.2	32.0	32.4	19.0	16.0	10.2
Do	6425	♀	42.8	36.8	16.8	8.0	34.0	6.2	31.0	30.0	19.0	15.2	11.0
Do	6426	----	40.0	36.2	17.0	7.8	35.4	6.0	32.0	30.8	19.6	18.8	10.2
La Grulla	[3] 10846 F. M.	♂	46.6	39.6	16.0	7.6	34.0	6.4	30.6	30.0	-----	-----	-----

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[1] Cotype.

[2] Type of *Myotis micronyx* Nelson and Goldman.

[3] Type.

Cranial measurements of Myotis evotis and M. milleri

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis evotis evotis													
British Columbia:													
Rock Creek	9. 10. 27. 2, B.M.	♂	16. 0	15. 0	----	3. 8	----	5. 2	11. 2	6. 0	----	6. 4	0
Shuswap	67138	♀	16. 2	15. 0	9. 4	3. 8	7. 4	5. 0	11. 6	6. 6	6. 0	7. 0	0
Cranbrook	51, Garrett	----	16. 1	15. 0	9. 5	3. 8	7. 5	5. 2	11. 6	6. 0	6. 0	6. 5	0
Do	54, Garrett	----	15. 6	14. 9	----	3. 6	7. 0	4. 9	11. 2	6. 1	5. 7	6. 5	0
Washington:													
Blue Mountains	C. 15, Lyman	♂	15. 4	14. 2	9. 0	3. 6	7. 2	5. 0	11. 0	6. 0	5. 6	6. 4	2
Do	C. 16	♂	15. 4	14. 4	9. 2	4. 0	7. 6	5. 2	11. 0	6. 0	6. 0	6. 4	1
Do	C. 22	♂	15. 2	14. 4	----	3. 6	7. 0	5. 0	11. 0	6. 0	5. 8	6. 2	0
Do	C. 45	♂	15. 4	14. 8	----	3. 8	7. 0	5. 0	11. 0	6. 0	5. 6	6. 4	0
Do	C. 52	♂	15. 4	14. 2	8. 6	3. 8	7. 2	5. 0	10. 8	6. 0	5. 8	6. 4	3
Do	C. 10	♀	15. 4	14. 6	9. 0	3. 6	7. 2	4. 8	10. 6	6. 0	5. 8	6. 2	0
Do	C. 26	♀	15. 2	14. 4	9. 0	3. 6	7. 2	5. 0	11. 0	6. 0	5. 8	6. 4	1
Do	C. 47	♀	15. 4	14. 6	----	3. 6	7. 2	5. 0	10. 8	6. 0	5. 8	6. 2	0
Do	A. 1	----	15. 0	14. 2	9. 0	3. 6	7. 0	4. 8	11. 0	6. 0	6. 0	6. 4	0
Do	B. 26	----	15. 4	14. 8	9. 2	3. 6	7. 2	5. 4	10. 8	6. 0	6. 0	6. 2	3
Do	B. 35	----	15. 2	14. 4	9. 0	4. 0	7. 0	5. 0	10. 6	6. 0	5. 8	6. 4	3
Do	B. 39	----	15. 2	14. 2	9. 0	3. 8	7. 0	5. 0	11. 0	6. 0	5. 8	6. 6	1
Do	B. 42	----	15. 6	14. 6	9. 0	3. 8	7. 4	5. 2	10. 8	6. 2	6. 2	6. 6	2
Do	C. 54	----	15. 0	14. 6	----	3. 8	7. 2	5. 0	11. 2	6. 0	6. 0	6. 6	1
Oregon:													
Fremont	204908	♂	15. 6	15. 0	8. 8	3. 6	7. 2	5. 0	11. 0	6. 0	6. 0	6. 2	0
Cornucopia	209218	♀	16. 2	15. 2	9. 2	3. 8	7. 2	5. 0	11. 2	6. 2	6. 0	6. 8	1
Sisters	204396	♀	15. 9	15. 0	----	4. 0	7. 4	5. 0	11. 2	6. 2	6. 0	6. 4	2
McKenzie Bridge	204395	♂	16. 0	15. 0	9. 2	3. 8	7. 6	5. 2	11. 4	6. 2	6. 0	6. 2	1
Camp Harney	144500	♂	15. 5	14. 4	----	3. 6	7. 2	5. 0	----	6. 0	5. 8	6. 6	1
Disaster Peak	207988	♂	15. 6	14. 2	9. 0	4. 0	7. 2	5. 0	11. 0	6. 2	6. 0	6. 4	1
Cedar Mountains	207989	♂	15. 5	14. 2	9. 0	4. 0	7. 2	5. 2	10. 8	6. 0	6. 0	6. 2	2
California: Sisson	95454	♀	----	----	----	3. 8	----	----	11. 2	6. 0	6. 0	6. 4	1
Myotis evotis chrysonotus													
Idaho:													
Albion	170099	♀	----	----	----	3. 8	7. 2	----	11. 0	6. 0	5. 9	6. 4	1
Do	170100	♀	----	----	----	----	----	----	10. 8	6. 0	----	6. 6	0
Montana:													
Big Belt Mountains	233473	♀	16. 4	15. 4	9. 6	3. 8	7. 2	5. 0	11. 6	6. 2	6. 2	6. 6	1
Buffalo	229526	♂	16. 2	15. 5	9. 8	3. 9	7. 4	5. 0	11. 5	6. 4	6. 1	6. 6	2
Do	229527	♀	16. 0	15. 2	9. 6	3. 8	7. 6	5. 0	11. 8	6. 4	6. 2	6. 8	2
Highwood Mountains	170027	♀	16. 0	14. 6	----	3. 8	7. 0	5. 0	11. 2	6. 2	----	6. 6	0
North Dakota: Grinnell	209037	♂	16. 2	15. 2	9. 2	3. 8	7. 2	5. 2	11. 4	6. 3	6. 2	6. 6	1
Colorado:													
Moguil	149200	♀	----	15. 0	----	3. 6	7. 2	5. 0	11. 6	6. 6	6. 2	6. 8	1
Snake River	148166	♂	15. 6	14. 6	----	3. 8	7. 2	5. 0	11. 0	6. 2	6. 1	6. 6	0
Do	147660	♀	15. 7	14. 6	9. 0	3. 8	7. 0	5. 0	11. 0	6. 0	5. 8	6. 6	1
Do	148161	♀	16. 0	15. 0	9. 6	3. 6	7. 0	5. 0	11. 2	6. 0	6. 0	6. 8	1
Do	148162	♀	16. 1	15. 0	9. 0	3. 8	7. 2	5. 2	11. 0	6. 0	5. 8	6. 4	0
Do	148163	♀	15. 7	14. 6	9. 4	3. 6	7. 2	5. 0	11. 2	6. 2	6. 0	6. 6	1
Do	148164	♀	15. 8	14. 4	9. 0	3. 6	7. 0	5. 0	11. 0	6. 0	6. 0	6. 6	0
Do	148165	♀	16. 1	15. 0	----	4. 0	7. 0	5. 0	11. 0	6. 0	6. 1	6. 6	0
Loveland	38680	----	16. 0	15. 0	----	3. 8	7. 2	5. 0	11. 4	6. 2	6. 0	6. 8	1
California:													
Mount Tallac	9405 M.C.Z.	♀	16. 1	15. 4	9. 6	3. 8	7. 5	5. 0	11. 5	6. 4	5. 9	6. 9	1
South Yolla Bolly Mountains	138030 U.S.N.M.	♀	----	15. 0	9. 0	3. 6	7. 2	5. 0	11. 2	6. 2	6. 0	6. 8	2
San Bernardino	187430	♂	15. 4	14. 4	----	3. 6	7. 2	4. 8	----	6. 0	6. 0	----	3
Lower California: Commondu	[1]146044	♂	15. 8	14. 9	9. 6	3. 7	7. 0	5. 0	11. 2	6. 0	6. 0	6. 4	1
Arizona:													
Paradise	124615	----	----	15. 0	----	3. 4	7. 2	5. 2	11. 6	6. 4	6. 1	6. 8	1
Do	124616	----	16. 0	15. 0	9. 2	3. 8	7. 2	----	11. 2	6. 4	6. 1	7. 0	1
Springerville	22492	----	----	15. 8	----	4. 0	7. 6	5. 2	12. 0	6. 4	6. 0	7. 0	0
Williams	112015	♂	----	----	----	3. 8	7. 4	----	11. 8	6. 6	6. 0	7. 0	1
Chihuahua: San Luis Mountains	63044	♀	15. 9	14. 8	9. 4	3. 6	7. 4	5. 2	11. 2	6. 2	6. 2	6. 6	1
Vera Cruz: Perote	88541	♂	16. 0	15. 4	9. 2	3. 9	7. 6	5. 4	11. 8	6. 8	6. 2	7. 1	1
Myotis milleri													
Lower California:													
San Pedro Martir Mountains	[2] 10846 F.M.	♂	15. 0	14. 2	----	3. 6	7. 0	4. 6	10. 8	5. 6	5. 8	6. 2	1
Do	10847	♂	14. 8	13. 8	----	3. 6	7. 2	4. 6	10. 0	5. 4	5. 6	5. 8	0
Do	6425 A. M. N. H.	♂	15. 0	13. 8	----	3. 6	7. 2	4. 6	----	5. 8	5. 6	6. 0	1
Do	6423	♀	15. 0	----	----	3. 4	----	----	10. 8	5. 6	5. 8	6. 2	1
Do	6424	♀	15. 2	14. 6	8. 8	3. 4	7. 0	4. 6	11. 0	6. 0	5. 8	6. 4	0
Do	6426	♀	15. 0	14. 2	9. 0	3. 6	7. 2	4. 6	10. 6	5. 8	5. 8	6. 2	1

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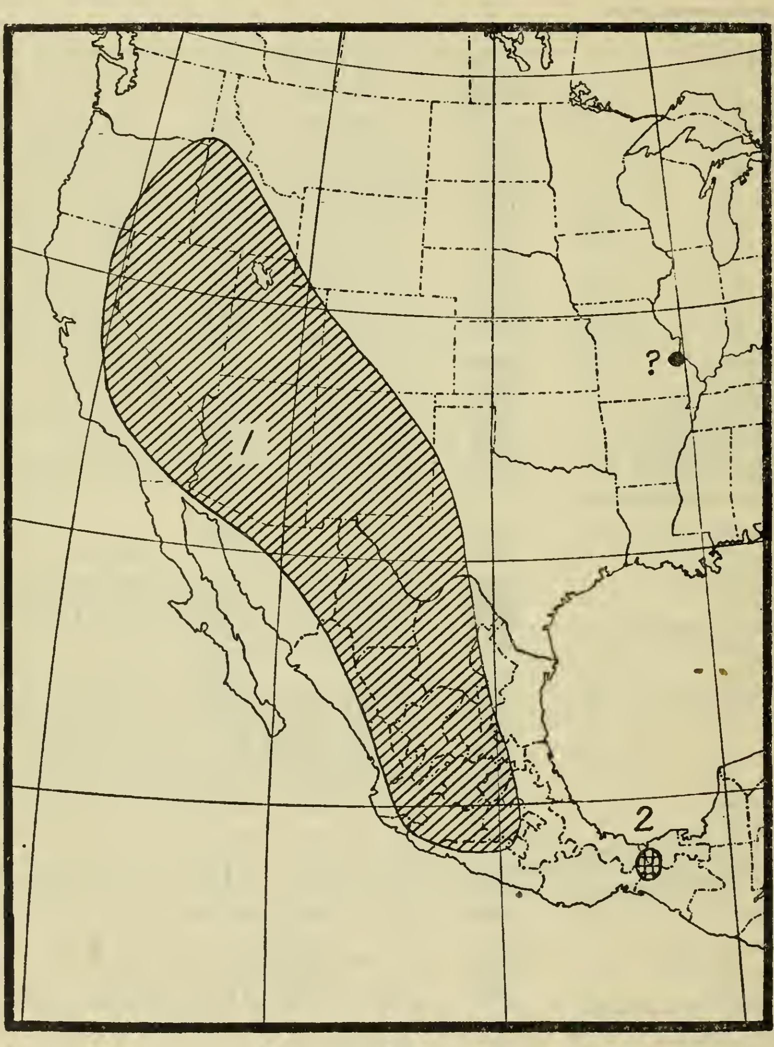
[1] Type of *Myotis micronyx* Nelson and Goldman.

[2] Type.

MYOTIS THYSANODES Miller

(Synonymy under subspecies)

Distribution.—From southeastern Washington, central California, Arizona, and New Mexico southward to the highlands of Oaxaca, southern Mexico; one record from Missouri.



MAP 8.—DISTRIBUTION OF MYOTIS THYSANODES: 1, M. THYSANODES THYSANODES; 2, M. THYSANODES AZTECUS

Diagnosis.—General appearance much as in *Myotis evotis* but size greater, about equalling that of *M. velifer* (forearm 40.6 to 46.0 mm.; greatest length of skull 16.2 to 17.2 mm.); tail relatively shorter (average ratio of tail to head and body in 10 specimens from California and Arizona 80.9, in 10 from New Mexico 75.2, and in 10 from San Luis Potosi 76.5); ear less enlarged (usually about 16 to 18 mm. in length); foot relatively longer (ratio of its length to that of tibia usually more than 50); and fringe of hairs along free border of interfemoral membrane well developed and conspicuous. Maxillary tooth row about 6.5 mm. in length, exceeded by the greatest width of palate including molars.

Ears.—The ears are elongated, when laid forward reaching from 3 to 5 mm. beyond the nose. Tragus long and slender, about 60 per cent of the height of the ear, its anterior border very slightly convex. The posterior border has a distinct squarish lobule at its base, succeeded by a right-angled notch, above which the outline is at first convex with a slightly crenulate edge, then faintly concave below the tip.

Wing and membranes.—The wing membrane arises from the side of the foot near the base of the toes. The third and fourth metacarpals are usually nearly equal, while the fifth is a trifle less, but there is a slight tendency for the fifth to be of equal length with the fourth. When folded, the third metacarpal falls about 1.5–2 mm. short of the elbow and is thus proportionately longer than in *Myotis evotis* in which the discrepancy is about the same but the forearm is shorter. Taking the third finger as 100, the fourth is 82, and the fifth 79; proportions which are essentially like those found in *M. evotis.* The minute terminal joint of the tail alone is free from the membrane. Free edge of the uropatagium bordered both above and below by a conspicuous fringe of short stiff hairs which occur in small tufts or clumps, about 15 hairs to each tuft. This fringe is usually quite evident to the eye without the help of a lens.

Foot.—The foot is proportionally larger than in *Myotis evotis*, its length usually more than half that of the tibia. In 9 topotypes the ratio of foot to tibia averages 53.7; in 10 specimens from New Mexico it averages 55.2; in 10 from San Luis Potosi, 53.3; and in 6 from Oaxaca, 55.9. Calcar heavy, without distinct keel, but the skin along its free margin is thickened and compressed to an evident edge. It terminates distally in a minute lobule.

Fur and color.—The pelage is full and rather long, the hairs about 9 mm. in length at the middle of the back. The hair is dark at the base with slightly buff tips above, and whitish tips below, that at the sides of the abdomen without dark bases.

Skull.—The skull resembles that of *Myotis evotis* but is immediately distinguishable by its greater size, better developed sagittal crest, less inflated auditory bullæ, and less narrowed rostrum (ratio of greatest breadth across molars to condylobasal length about 44 instead of about 40; greatest breadth across molars usually much greater than length of maxillary tooth row); mandible obviously larger and more robust. As compared with the skull of *Myotis velifer*, with which it agrees in general size, that of *M. thysanodes* is more slender and delicate, the brain case narrower and more oval in outline. The sagittal crest is about as well developed as in *M. velifer* but the occiput is inflated posteriorly so that the lambdoid crests do not meet at the vertex to cut off a raised triangular area. As seen from above, therefore, the hind margin of the skull is not truncate but is bowed backward; while in rear view the vertex is not peaked but is evenly arched. In palatal aspect the distance between the last molar and the audital bulla is obviously less, both relatively and absolutely than in *Myotis velifer;* the palate ends in a well-defined projection medially.

Teeth.—The molars are normal in the relation of their width to that of the palate, not enlarged as in *Myotis velifer* and *M. occultus*, though distinctly larger than in *M. evotis.* In the first and second tooth there is no metaloph and the protoconule and paraloph are usually absent (fig. 1 *e*, p. 8), though either or both may be slightly developed, particularly in m^2. This extreme simplification of structure is not known in other American species of *Myotis*, though it is occasionally approached in *M. evotis.* The third molar, as in all the other known American members of the genus, retains a distinct protoconule. Cingulum of m^1 and m^2 usually wide and distinct, better developed than in *Myotis velifer*, though not actually passing around the antero-lingual base of the protocone. At the postero-lingual base of the hypocone the cingulum occasionally becomes thickened and tubercle-like, a condition especially well shown in the type.

The two small upper premolars are usually both visible in side view, though drawn inward slightly from the tooth row; there is somewhat more variation in their exact position than in related species. In one specimen (52186 U.S.N.M.) both the minute upper premolars are missing on the left side while on the right side the larger only is present, almost completely filling the space between canine and p^4, while in another (52228 U.S.N.M.) the two small teeth are united.[14]

Remarks.—Externally *Myotis thysanodes* may be distinguished from *M. evotis* by its greater size and less enlarged ears. Its fur is not so full nor so golden in color, a difference fairly obvious on direct comparison. The ears are usually brownish instead of black. The free edge of the tail membrane is so thickly edged with short coarse hairs that they form a fringe which is clearly obvious to the naked eye, whereas in *Myotis evotis* the fringe is less dense and not distinctly visible without a lens. The presence of this conspicuous fringe distinguishes *Myotis thysanodes* from all other known American members of the genus. In the reduced condition of the secondary cusps and ridges of m^1 and m^2 *Myotis thysanodes* shows the culmination of a series of changes whose earlier stages are seen in *M. keenii* and whose development may be traced in *M. evotis.*

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[14] Figured by Miller, North Amer. Fauna, No. 13, p. 82, Oct. 16, 1897.

The possibility that *Myotis thysanodes* is the American representative of the palearctic *M. nattereri* has been suggested by Thomas.[15] The range of the Old World species is, however, across temperate Eurasia from western Europe to Japan (subspecies *bombinus*) whereas that of *Myotis thysanodes* in America is more southern, almost subtropical. An equally near relationship is perhaps to be found between *Myotis nattereri* and *M. evotis.* The northern limits of these two species in the Old and New Worlds respectively reach about the same latitude, so that the ancestor of *M. evotis* may have easily invaded North America from Asia during a Pliocene connection of the two continents. Whatever may have been their exact history it seems evident that the three animals represent a common parent stock.

Two subspecies are recognized: The typical form ranging from Washington and California to northern and central Mexico, and a darker-colored race occurring in southern Mexico and here described as new.

Habits.—Beyond the account supplied by Dr. T. S. Palmer (Miller, 1897) of the colony at Old Fort Tejon, Calif., nothing seems to be recorded as to the habits of this bat. Doctor Palmer found this species and *M. yumanensis* in numbers in the dark attic of an old adobe house, July 3. Young in various immature stages as well as adults of both species were secured, among which *Myotis thysanodes* appears to have been in the majority. Dr. Joseph Grinnell visited the locality 13 years later but failed to find this bat. On September 28, 1903, James H. Gaut, collecting for the United States Biological Survey, obtained several in the ruins of Gran Quivera, Mesa Jumanes, N. Mex. A note on the label of specimens collected by Sallé in Oaxaca in 1857, states that they too were found in an old ruin. The late Dr. E. A. Mearns captured two adult females on June 28 in the San Luis Mountains (on the Mexican boundary) that contained each a large fetus nearly ready for birth. During the breeding season the females appear to remain in colonies by themselves apart from the males until late summer at least. Such a breeding colony was discovered by Mr. Vernon Bailey on August 9, 1913, at Cloverdale Hills, N. Mex., and 83 specimens were preserved, most of them in alcohol. An examination of these, evidently taken at random, shows that 53 are adult females and the rest young animals, males and females in about equal proportions, most of them nearly full grown but with the metacarpal epiphyses still showing immaturity. No adult males had as yet joined the colony. Under natural conditions this is doubtless a cave-haunting species. *Myotis thysanodes* seems to be less common or at least more sporadic than *Myotis velifer*, for though the two animals occur over much the same general area, collections contain far fewer examples of this species than of the latter.

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[15] Proc. Zool. Soc. London, 1905, p. 338.

MYOTIS THYSANODES THYSANODES Miller

Vespertilio subulatus H. Allen, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 51, June, 1864 (part; specimen supposed to have been collected at St. Louis, Missouri, listed on page 53).

Vespertilio albescens velifer H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 93, March 14, 1894 (part; specimen from Dulzura, California).

Vespertilio albescens evotis H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 90, March 14, 1894 (part; specimen No. 29827, U. S. N. M., Fort Tejon, California).

Myotis thysanodes Miller, North Amer. Fauna, No. 13, p. 80, figs. 16–17 (teeth), October 16, 1897.—Trouessart, Catal. Mamm. viv. foss., p. 1285, 1899.—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 258, December 27, 1901.—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 572, 1904.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 94, 1904.—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 479, 1905.—Stephens, California Mammals, p. 268, 1906.—Elliot, Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 505, 1907.—Lyon and Osgood, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 273, January 28, 1909.—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 59, December 31, 1912.—J. Grinnell, Proc. California Acad. Sci., ser. 4, vol. 3, p. 278, August 28, 1913.—H. W. Grinnell, Univ. California Publ. Zool., vol. 17, p. 297, January 31, 1918.—J. Grinnell, Univ. California Publ. Zool., vol. 21, p. 314, January 27, 1923.—Miller, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 73, April 29, 1924.—Grinnell and Storer, Anim. Life in the Yosemite, p. 57, 1924.

Myotis evotis thysanodes Elliot, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 406, March, 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 518, June 1901.

Type locality.—Old Fort Tejon, Tehachapi Mountains, Kern County, Calif.

Type specimen.—Adult female (in alcohol), No. 29827, United States National Museum (Biological Survey collection), collected at Old Fort Tejon, Tehachapi Mountains, Kern County, Calif., July 5, 1891, by T. S. Palmer. Original number, 235.

Distribution.—From southeastern Washington, central California, Arizona, and New Mexico southward into northern and central Mexico; exact limits of range not known. (See map 8, p. 122.)

Diagnosis.—General color a pale yellowish brown.

Color.—Upper parts a uniform "warm buff" (Ridgway, 1912), the tips of the hairs slightly shining; basally the hairs are "fuscous black" and a small area of this color is sometimes present at the shoulder. Below, the general tone is dull whitish due to the fuscous-black bases of the hairs showing through the buffy white tips. Along a narrow strip at the sides of the abdomen the hairs are whitish to the roots.

Measurements.—For measurements see tables, pages 128 to 130.

Specimens examined.—Total number 193, from the following localities:

ARIZONA: Beale's Spring, 1 alc. (U.S.N.M.); Flagstaff, 1 alc. (A. M. N. H.); Springerville, 1 skull (U.S.N.M.).

CALIFORNIA: Old Fort Tejon, 14 alc., including type (U.S.N.M.); Walker Pass, 1 alc. (U.S.N.M.).

CHIHUAHUA: San Luis Mountains, 2 skins (U.S.N.M.).

JALISCO: La Laguna, 1 skin (U.S.N.M.), not typical; Los Masos, 7 skins (A. M. N. H.), not typical.

MICHOACAN: Patzcuaro, 2 skins, not typical, 2 alc. (U.S.N.M.).

MISSOURI: St. Louis, 1 alc. (U.S.N.M.).

NEW MEXICO: Carlsbad, 1 alc. (U.S.N.M.); Cloverdale, Grant County, 18 skins, 65 alc. (U.S.N.M.); Copperton, Valencia County, 1 skin (U.S.N.M.); Espanola, 1 alc. (U.S.N.M.); Gallup, McKinley County, 1 skin (U.S.N.M.); Mesa Jumanes, 3 skins (U.S.N.M.); "Mountains of New Mexico," 1 skin (U.S.N.M.); Sacramento Mountains, Otero County, 1 alc. (A. N. S. P.).

SAN LUIS POTOSI: Hacienda La Parada, 6 skins, 56 alc. (U.S.N.M.); 1 alc. (B. M.).

WASHINGTON: Anatone, Asotin County, 1 skin (U.S.N.M.).

ZACATECAS: Hacienda San Juan Capistrano, 1 skin, 3 alc. (U.S.N.M.).

Remarks.—It seems characteristic of *Myotis thysanodes thysanodes* to be found somewhat sporadically. In California the animal has been recorded from only five localities, Dulzura, San Diego County (Miller, 1897), Fyffe and Limekiln, El Dorado County (H. W. Grinnell, 1918), Old Fort Tejon, Kern County, and Walker Pass, Kern County. Yet its range may be expected to include most of the austral zone area of the State. A single individual has been taken in Asotin County, southeastern Washington, but the species has apparently not yet been detected in Oregon or Nevada. An alcoholic specimen in the United States National Museum (No. $\frac{5344}{38025}$), received many years ago (catalogued in 1861), is labeled: "St. Louis, Missouri, Dr. Engleman." If there is no mistake about this record, St. Louis marks the extreme known eastward limit of the animal's range.

In northern and central Mexico the color becomes gradually darker, so that specimens from San Luis Potosi and Zacatecas are practically intermediate between the typical form and the southern race. Five specimens from San Luis Potosi, Mexico, are not typical.

One is as pale above as the average of New Mexican skins, one is nearly as dark as those from Oaxaca, and the others are intermediate, but all are perhaps best referred to the subspecies *thysanodes*. In the series of 20 skins from Cloverdale Hills, southwestern New Mexico, one or two are more intensely colored than the average.

MYOTIS THYSANODES AZTECUS, new subspecies

Type.—Skin and imperfect skull, No. 58.6.2.3 British Museum (Natural History), collected at San Antonio, Oaxaca, Mexico. Tomes collection, 1860.

Distribution.—Southern Mexico (Oaxaca). (See map 8, p. 122.)

Diagnosis.—Similar to the typical form, but darker in color.

Color.—The color is a uniform "tawny olive" above, the tips of the hairs somewhat shining, their bases dark, nearly fuscous black; a dark fuscous spot at the shoulder. Below, the paler tips to the hairs are tinged with buffy, producing a duller effect than the whitish tips of typical *Myotis thysanodes*.

Skull.—The skulls of the specimens from Oaxaca are all damaged posteriorly and have the zygomatic arches broken. They are nevertheless obviously shorter of rostrum than in the typical subspecies.

Measurements.—For measurements, see tables, pages 128 to 130.

Specimens examined.—Total number 6, from the following localities:

OAXACA: Hacienda de Cinco Señores, 5 skins (B. M.); San Antonio, 1 skin (B. M.).

External measurements of Myotis thysanodes

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis thysanodes thysanodes													
Arizona:													
Beale's Spring	131914	♀	47.6	41.0	18.0	10.2	45.4	7.4	41.2	39.4	17.0	15.4	11.0
California:													
Old Fort Tejon	29823	♀	46.8	37.0	17.0	8.0	42.6	7.0	40.2	38.6	18.0	16.0	10.0
Do	29824	♀	44.0	37.0	15.6	8.4	39.8	7.0	38.0	36.2	16.6	14.0	10.0
Do	[1] 29827	♀	51.0	36.0	18.0	8.0	41.0	6.4	39.0	37.0	18.0	14.0	11.0
Do	29831	♀	45.4	37.6	16.4	8.4	40.8	8.0	37.4	36.0	17.8	15.2	9.6
Do	29832	♀	47.0	39.6	16.0	8.6	41.0	8.0	39.0	37.0	16.4	14.0	10.4
Do	29833	♀	50.2	38.2	17.0	8.8	42.4	7.2	38.8	38.0	18.0	14.0	11.0
Do	29848	♀	43.4	43.6	18.0	9.0	44.2	6.8	41.0	39.0	17.6	14.0	10.0
Do	29851	♀	46.2	37.0	16.4	7.6	40.6	6.6	38.4	36.4	17.0	14.0	9.0
Do	29856	♀	50.8	35.4	16.0	8.8	41.0	6.4	39.0	37.6	16.8	14.2	10.0
New Mexico:													
Cloverdale Hills	157646	♀	47.4	37.0	16.0	9.2	42.2	7.0	40.0	39.0	16.0	14.2	10.8
Do	157662	♀	52.0	40.8	18.4	10.0	44.8	7.0	41.0	39.6	17.2	16.2	11.0
Do	157665	♀	50.0	35.0	16.6	9.4	42.6	7.0	38.6	36.8	16.0	16.0	10.6
Do	157668	♀	46.4	37.0	16.2	9.6	43.4	8.0	40.4	39.0	16.0	14.2	10.4
Do	157670	♀	48.6	36.0	17.6	9.0	42.4	7.4	39.6	38.0	17.0	16.0	10.8
Do	157674	♀	49.6	35.6	17.4	9.8	44.6	7.0	40.8	39.2	17.0	15.8	11.2
Do	157685	♀	51.6	39.4	18.6	10.4	44.6	8.2	42.4	39.4	17.8	16.0	11.0
Do	157687	♀	50.2	39.8	18.0	9.8	44.8	7.8	41.0	39.2	18.2	15.8	10.4
Do	157688	♀	47.8	38.0	17.2	8.8	42.4	6.6	40.6	38.8	16.0	15.0	11.2
Do	157707	♀	51.6	35.8	-----	9.0	44.0	7.2	38.6	39.0	17.8	15.8	11.4

[1] Type.

External measurements of Myotis thysanodes—Continued

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis thysanodes thysanodes—Continued													
San Luis Potosi:													
Hda. La Parada	252183	♂	49.0	38.0	16.2	9.4	44.0	7.2	40.0	38.2	18.0	16.0	11.0
Do	52191	♀	50.8	39.8	18.0	9.8	46.0	7.0	42.0	40.2	17.6	16.0	10.4
Do	52197	♀	49.8	38.4	17.6	9.8	46.0	7.4	41.0	40.0	17.6	15.8	10.4
Do	52221	♀	51.0	39.0	17.4	9.0	45.4	7.0	42.0	40.0	19.0	15.8	10.2
Do	52222	♀	51.0	38.6	17.0	9.4	44.2	7.2	42.0	39.2	18.0	17.4	12.0
Do	52230	♀	51.8	37.0	17.4	8.6	44.8	7.6	42.0	40.6	18.6	16.8	10.4
Do	52242	♀	49.0	38.6	18.4	9.4	44.0	7.4	42.0	39.6	18.2	17.0	11.0
Do	52243	♀	50.4	37.4	18.0	9.0	45.0	7.0	44.6	43.0	18.4	15.2	11.0
Do	52247	♀	52.0	40.4	18.0	9.0	45.0	7.0	41.0	39.2	18.6	16.0	11.4
Do	52249	♀	51.0	39.8	17.0	10.0	44.0	7.8	41.8	39.4	16.0	15.6	11.6
Michoacan: Patzcuaro	52272	♀	48.6	37.0	15.0	9.0	43.0	7.2	40.2	39.6	16.4	15.4	10.2
Zacatecas:													
Hda. San Juan Capistrano	92378	♀	50.0	38.6	15.0	9.6	42.6	7.2	42.4	41.0	17.4	16.0	11.2
Do	92386	♀	48.4	35.2	16.6	8.8	43.0	7.6	40.0	39.2	17.2	15.8	11.0
Myotis thysanodes aztecus													
Oaxaca:													
San Antonio	[1] 58.6.2.3 B.M.	----	----	----	16.0	9.4	43.4	8.0	----	----	----	----	----
Hda. de Cinco Señores	58.6.2.4	----	----	----	17.0	8.8	45.0	7.6	----	----	----	----	----
Do	7.1.1.523	----	----	----	16.6	9.4	43.0	8.0	----	----	----	----	----
Do	7.1.1.524	----	----	----	16.0	9.0	43.0	7.6	----	----	----	----	----
Do	7.1.1.525	----	----	----	16.0	9.0	43.0	8.0	----	----	----	----	----
Do	7.1.1.526	----	----	----	16.0	9.0	44.0	8.0	----	----	----	----	----

[1] Type.

Cranial measurements of Myotis thysanodes

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m³	Mandibular tooth row	Wear of teeth
Myotis thysanodes thysanodes													
Washington: Anatone	232375	♂	16.8	----	----	4.1	----	----	11.8	6.4	6.5	6.9	0
California:													
Fort Tejon	[1] 29827	♀	16.5	15.0	10.4	4.0	8.0	5.6	11.6	6.5	7.0	7.0	1
Do	49330	♀	16.8	15.8	----	4.0	7.8	5.4	11.8	6.6	6.4	7.0	1
Do	29833	♀	16.2	15.5	10.0	4.0	7.9	5.6	11.9	6.2	6.4	6.8	0
New Mexico:													
Copperton	137748	♀	16.6	15.8	----	4.0	8.0	5.6	12.2	6.6	7.0	7.2	1
Gallup	137504	♂	16.8	16.0	9.2	3.8	7.2	5.0	11.8	6.4	6.5	7.0	1
Mesa Jumanes	130699	♂	16.6	15.2	10.0	4.0	8.0	5.4	12.0	6.4	7.0	6.8	2
Do	130700	♀	16.8	15.2	10.4	4.0	8.0	5.6	12.0	6.4	7.0	7.0	3
Do	130701	♀	17.2	15.8	10.4	4.0	8.0	5.4	12.0	6.4	6.8	7.0	1
Cloverdale Hills	157602	♂	16.5	15.2	10.2	4.0	7.8	5.4	----	6.2	6.8	----	1
Do	157603	♂	16.4	15.0	10.0	4.0	7.8	5.8	11.6	6.2	6.7	6.8	0
Do	157604	♂	16.2	15.0	----	4.0	7.8	6.0	11.4	6.2	6.8	6.8	0
Do	157044	♀	17.1	15.8	10.6	4.0	8.0	5.6	12.0	6.6	6.9	7.2	1
Do	157047	♀	17.0	15.6	----	4.0	8.0	5.2	12.2	6.4	6.9	7.0	1
Do	157048	♀	16.8	15.4	----	4.0	8.0	5.4	11.8	6.2	6.6	7.0	1
Do	157159	♀	16.6	15.0	10.2	4.0	8.0	5.6	12.0	6.0	6.8	6.6	3
Do	157162	♀	17.0	15.6	10.0	4.0	7.8	5.4	12.2	6.6	7.0	7.0	1
Do	157605	♀	17.0	15.6	10.4	4.0	8.0	5.6	12.2	6.4	6.9	7.0	1
Do	157606	♀	16.8	15.4	10.4	4.0	8.0	----	11.6	6.2	6.5	7.0	1
Do	157607	♀	17.2	15.6	10.4	3.8	8.0	5.6	12.2	6.6	7.0	7.2	1
Do	157611	♀	16.6	15.4	10.4	4.0	8.0	5.6	11.8	6.4	6.7	6.8	0
Chihuahua:													
San Luis Mountains	36574	♀	----	16.0	10.6	4.0	8.2	6.0	12.2	6.4	7.0	7.0	3
Do	36577	♀	17.1	15.6	10.2	4.0	7.8	5.6	12.0	6.4	6.8	7.0	

[1] Type.

Cranial measurements of Myotis thysanodes—Continued

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis thysanodes thysanodes—Continued													
San Luis Potosi:													
Hda. la Parada	50809	♀	-----	15.8	10.2	4.0	8.2	6.0	12.2	6.4	6.8	7.0	3
Do	50810	♀	-----	15.6	-----	4.0	8.0	5.6	11.8	6.4	----	6.8	1
Do	50812	♀	16.8	15.8	10.4	4.0	7.8	5.8	12.2	6.2	6.9	7.0	1
Do	50813	♀	-----	-----	10.8	4.0	7.8	5.4	12.2	6.4	6.8	7.0	3
Do	52228	♀	16.8	16.0	10.2	4.2	8.0	6.0	12.2	6.6	6.8	7.0	2
Jalisco: La Laguna	88028	♂	16.5	15.0	10.0	4.0	7.8	5.8	11.6	6.6	6.7	6.8	1
Michoacan:													
Patzcuaro	50797	♂	16.2	15.0	10.0	4.0	8.0	5.8	11.6	6.2	6.8	7.0	1
Do	50799	♂	16.4	15.2	10.2	4.0	8.0	5.6	11.8	6.2	6.6	6.8	1
Myotis thysanodes aztecus													
Oaxaca:													
San Antonio	[1] 58.6.2.3 B. M.	----	-----	-----	-----	4.0	8.0	----	11.8	6.2	6.8	6.8	2
Hacienda de Cinco Señores	7.1.1.523	----	-----	-----	10.0	4.2	8.0	----	12.1	6.3	6.6	6.7	1
Do	7.1.1.524	----	-----	-----	10.0	4.2	8.1	----	11.8	6.4	7.0	6.9	0
Do	7.1.1.525	----	-----	-----	-----	4.0	----	----	12.0	6.2	6.5	6.7	0
Do	7.1.1.526	----	-----	-----	-----	4.0	----	----	12.1	6.5	6.6	7.0	0

[1] Type.

MYOTIS SODALIS, new species

Myotis lucifugus Miller, North Amer. Fauna, No. 13, p. 59, October 16, 1897 (part; specimens from Mammoth Cave, Ky., listed on page 62).—Hahn, Mamm. of Indiana, 33d Ann. Rept. Dept. Geol. and Nat. Resources Indiana, 1908, p. 621, 1909 (part; specimens from Wyandotte Cave, Ind.).—Cory, Mamm. of Illinois and Wisconsin, Field Mus. Nat. Hist., publ. 153, zool., vol. 11, p. 455, 1912 (part; specimens from Wyandotte Cave, Ind.).

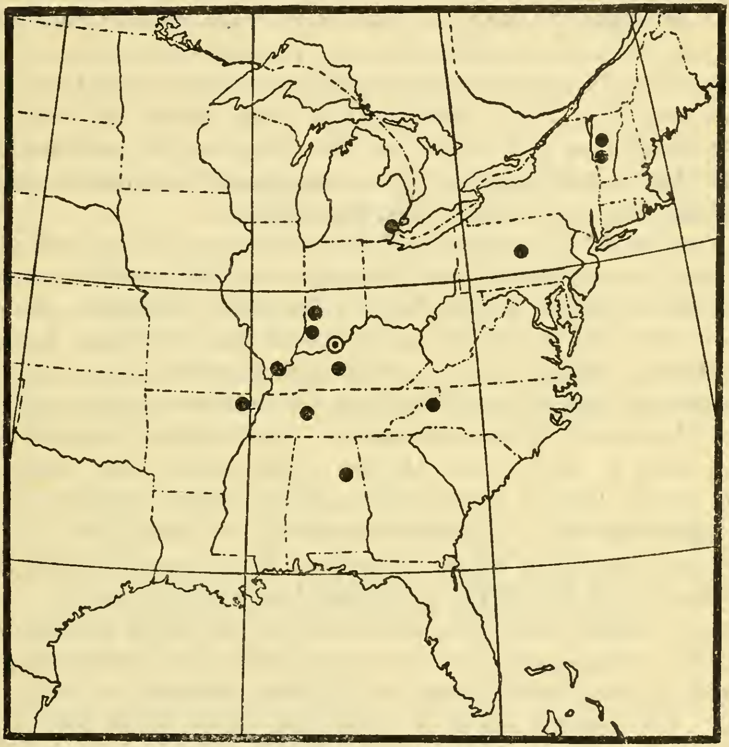
Type.—Adult female (skin and skull), No. 10980, Museum of Comparative Zoology, from Wyandotte Cave, Ind. Collected March 7, 1904, by J. O. Sibert.

Distribution.—Eastern United States from the central Mississippi Valley and northern Alabama to the western part of New England.

The specimens studied, chiefly from wintering localities, probably do not give a true idea of the summer distribution, for these hibernating colonies may have come together from a considerable area. Many individuals seem to leave the winter quarters in spring instead of remaining in the caves to breed, though at Anniston, Ala., Dr. E. R. Dunn obtained a male in Weaver's Cave on August 8, and the United States National Museum has three taken in August in the Wyandotte Cave, Ind. In the latter cave and in the Mammoth Cave, Ky., *Myotis sodalis* is the common wintering bat. Thirteen were taken in February from a cave in Center County, Pa.

Diagnosis.—Size and general appearance as in *Myotis lucifugus lucifugus*, but with slightly longer tail (average ratio of tail to head and body in 10 specimens from Vermont, 80.6; in 10 from Mammoth Cave, 81.0); less enlarged foot (often not more than one-half the length of tibia, the ratio of its average length to the average length of tibia ranging from 49.3 to 51.7 instead of from 53 to 55.7), usually though not always keeled calcar, and by the pinkish-gray color and loose texture of the fur. Forearm 36 to 40.6 mm. (usually 38 to 39 mm.). Skull with a narrower brain case and more pronounced sagittal crest than in *Myotis lucifugus.*

Ears.—The ear is about as in *Myotis lucifugus*, of medium size, its lower anterior border convex, then nearly straight in its upper half, with a broadly rounded summit, below which the outer margin is very slightly concave, then passes gradually into the basal shoulder without forming a notch or abrupt transition. Laid forward the ear reaches to the tip of the nostril. Tragus rather short and blunt, curving slightly forward, its total height a little less than half the total height of the ear from outer corner to tip (about as 6:14 mm.). The posterior edge is slightly crenulate.



MAP 9.—DISTRIBUTION OF MYOTIS SODALIS

Wing and membranes.—Wing from the side of the foot, beginning just below the base of the outer toe at the head of the metatarsal. The metacarpals are regularly graduated, the third longest, the fourth and fifth successively a trifle shorter. The lengths of the fingers are similarly graduated. Taking the third finger as 100, the fourth and fifth are respectively as 73 and 67 (69.5:50.5:46.5 mm.), that is, the fourth and fifth fingers are relatively short. When folded, the third metacarpal falls short of the elbow by about 4.5 mm. On the under side of the wing the fur extends thickly as far as a line joining the knee and the middle of the humerus, and on the upper side of the interfemoral membrane as far as a line joining the extended knees. The minute terminal vertebra of the tail and about one-half of the penultimate vertebra project free.

Foot.—The foot is smaller and more delicately formed than in *Myotis lucifugus*, its length a little more than one-half that of the tibia. In 10 specimens from Proctor, Vt., the ratio of foot to tibia averages 50.6; in 10 from Center County, Pa., 49.3; in 10 from Mammoth Cave, Ky., 51.7. The calcar is long, about 16.5 mm., and nearly equals the free border of the interfemoral membrane. It usually has a low keel, but this is occasionally obsolete or absent. The calcar ends in a minute projecting lobule.

Fur and color.—The texture of the fur is extremely fine and fluffy; the hairs have a tendency, due perhaps to a slight crinkling, to stand out from each other a little, as in *Pipistrellus subflavus.* In comparison with the bronzy burnished-tipped fur of *Myotis lucifugus* the pelage of this species is dull grayish chestnut, though on close inspection the longer tips of the hairs are seen to be slightly polished. Series of skins of the two animals are very different in appearance.

The color is distinctive. On the upper surface the basal two-thirds of the hair is fuscous-black, then comes a narrow grayish band succeeded by a cinnamon-brown tip, so that there is a distinctly tricolor effect, while the grayish band showing through the cinnamon-brown tips gives a peculiar hoary appearance at a short distance. Below, the fur is slaty basally, the hairs with grayish-white tips, washed more or less heavily with cinnamon brown, particularly at the flanks, instead of slightly yellowish as in *M. lucifugus.* The general effect is a pinkish white below and a dull chestnut gray above. The membranes and ears are blackish brown. One unusually bright skin from Proctor, Vt., is dark cinnamon above, nearly "sayal brown" of Ridgway, slightly washed with the same on the sides of the chest.

Skull.—The skull in general resembles that of *Myotis lucifugus lucifugus* with which it agrees in length (usually 14.4 to 15 mm.). In form it differs in certain details that become evident on close comparison. The most striking of these is the smaller, narrower brain case (6.6 to 7.2 mm. instead of 7.1 to 7.6 mm.), which instead of being high and with a broadly flattened top is narrower, lower, (4.6 to 5.1 mm. instead of 4.9 to 5.5 mm.) and more arched transversely than in *M. l. lucifugus.* A slight but perfectly definite sagittal crest is normally present in adults, whereas in *M. l. lucifugus* the brain case is so broad-topped that the temporal muscles rarely meet to form a sharp ridge.[16] Correlated with this difference is the more tapering front end of the brain case, a slightly narrower interorbital constriction (3.5 to 3.9 mm. instead of 4.0 to 4.4 mm.) with more graceful lines; and a slightly larger rostrum as compared with the brain case, features which are obvious to the eye, and consistently borne out by actual measurements. The length of the maxillary tooth row is essentially the same as in *Myotis lucifugus* (usually 5.2 to 5.6 mm.), but the maxillary breadth at m^3 is distinctly less (usually 5.3 to 5.8 mm. instead of 5.5 to 6.1). These cranial differences between the two species become obvious on comparison of the tables of measurements pages 134 and 135.

Teeth.—The teeth are so similar to those of *Myotis lucifugus lucifugus* that we have been unable to detect any positive characters by which they may be recognized. Apparently the two small upper premolars tend to be more nearly equal in area when seen in crown view, but this feature is not constant. The cingulum and the secondary cusps and ridges are developed as in *M. lucifugus*. In a specimen from Arkansas (No. 5831 F. M.) the second upper premolar is absent on both sides.

Measurements.—For measurements see tables, pages 134 and 135.

Specimens examined.—Total number 443, from the following localities:

ALABAMA: Anniston, 1 alc. (M. C. Z.).
ARKANSAS: Greenway, 2 skins (F. M.).
ILLINOIS: Rosiclare, 6 skins, 4 alc. (F. M.); no exact locality, 1 alc. (U.S.N.M.).
INDIANA: Bicknell, 1 alc. (U.S.N.M.); Wheatland, 3 alc. (U.S.N.M.); Wyandotte Cave, 3 alc. (U.S.N.M.), 14 skins, 3 alc. (F. M.), 10 skins including type, (M. C. Z.).
KENTUCKY: Mammoth Cave, 269 alc. (U.S.N.M.), 6 alc. (A. N. S. P.), 1 alc. (B. M.). 20 alc. (M. C. Z.).
MICHIGAN: Grosse Isle, 1 skin (U.S.N.M.).
NORTH CAROLINA: Roan Mountain, 1 alc. (U.S.N.M.).
PENNSYLVANIA: Center County, (cave), 2 skins, 25 alc. (U.S.N.M.).
TENNESSEE: Hickman Co., 1 skin (A. M. N. H.).
VERMONT: Brandon, 2 skins, 9 mummies (U.S.N.M.); Proctor, 21 skins, 37 alc. (U.S.N.M.).

Remarks.—That *Myotis sodalis* has been so long overlooked is due no doubt to the general resemblance which the animal bears to *Myotis lucifugus*, with which species the specimens of it in museums have generally been confused; when once its characters are recognized, however, there is no doubt as to its identity. Not only is the tricolor fur, with the characteristic pinkish-gray tinge distinctive, but the slightly smaller size of the foot and the normal presence of an obvious keel on the edge of the calcar are further diagnostic.

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[16] In 20 skulls of *Myotis sodalis* from Mammoth Cave the sagittal crest is present eighteen times, while in 20 skulls of *M. lucifugus lucifugus* it is present only three times and then much less well developed than in the average of the other species.

It is true that in distorted or badly preserved specimens the keel may not always be evident, and the color of the fur is not to be made out in bleached alcoholic material; but the smaller foot is usually sufficient to separate *Myotis sodalis* from *M. lucifugus*, and the skull, in its smaller size, more slender form and slight median crest, is likewise sufficiently diagnostic.

It is a curious fact that although this bat occurs over much of the eastern United States, nearly all the known individuals were taken during hibernation. A series was secured in a cave at Proctor, Vt., in early April, where a few *Myotis lucifugus* were found at the same time. A great number annually winter in the Wyandotte Cave, Ind. Two or three lots of bats from this station include this species only. Where these bats go with the coming of spring and in what way their habits differ from those of *Myotis lucifugus* it is impossible to say. Yet it seems probable that some difference in habits exists, for *Myotis sodalis* has not been captured as *M. lucifugus* so often is, either in small colonies in buildings or as single individuals shot while flying about the edges of ponds and along streams.

External measurements of Myotis sodalis

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Vermont:													
Proctor	207108	♂	46.4	35.8	15.0	7.4	37.4	6.0	34.0	32.4	13.6	11.8	9.0
Do	207109	♂	46.4	37.0	15.2	7.8	40.0	6.6	35.4	33.0	13.0	12.0	9.0
Do	207110	♂	46.6	35.0	14.6	7.8	36.0	6.0	33.0	31.0	13.4	10.8	9.0
Do	207111	♂	45.0	38.8	15.6	7.8	38.0	6.0	34.4	32.0	13.8	12.2	9.0
Do	207112	♂	45.8	37.8	15.0	8.0	39.0	6.0	33.6	32.0	13.8	12.2	8.8
Do	207116	♀	45.6	41.0	15.0	8.0	39.0	6.0	35.6	33.2	13.0	12.0	9.0
Do	207116	♀	45.2	39.0	14.6	7.0	36.2	5.8	34.0	32.0	13.0	10.6	8.6
Do	207121	♀	49.0	36.0	16.2	8.0	40.0	6.0	35.4	33.6	13.8	10.8	9.4
Do	207123	♀	45.6	36.0	15.6	7.8	39.0	6.4	36.0	34.0	13.4	11.2	8.8
Do	207124	♀	43.8	34.2	15.0	7.2	39.0	6.0	35.4	33.6	12.4	11.0	8.8
Pennsylvania:													
Center County	32319	♀	45.0	32.0	15.0	7.4	38.0	5.8	34.8	33.0	11.8	10.4	8.4
Do	32321	♂	43.8	27.0	16.8	8.0	40.0	6.0	34.8	33.0	12.0	11.0	8.2
Do	32322	♂	43.0	39.2	15.6	7.8	39.4	7.0	35.8	34.8	13.0	11.6	9.0
Do	32323	♀	48.2	32.6	15.2	7.0	37.4	5.8	34.2	32.4	12.4	10.6	8.8
Do	32324	♂	46.4	32.0	16.0	7.8	38.2	6.0	34.2	32.4	12.4	10.2	8.6
Do	32325	♂	42.2	36.0	15.0	8.0	38.0	6.4	34.4	32.0	13.4	11.8	8.0
Do	32326	♂	45.0	35.0	14.8	7.0	38.8	5.6	35.0	32.6	13.0	11.8	9.0
Do	32328	♂	45.4	36.0	15.8	7.6	38.0	6.0	34.6	31.6	12.8	11.0	9.0
Do	32329	♂	41.4	31.0	15.2	7.8	38.4	5.6	35.4	34.0	12.8	11.4	8.8
Do	32330	♂	46.6	38.8	16.8	8.6	40.2	7.0	36.0	33.8	12.0	12.0	8.8
Indiana:													
Bicknell	136455	♀	44.8	36.4	15.8	8.0	39.0	6.6	36.8	34.2	14.8	13.0	9.2
Wheatland	15595	♀	44.8	38.0	16.2	8.0	39.0	7.0	36.0	33.2	14.0	11.6	8.8
Do	15597	♀	49.0	38.8	16.0	8.0	40.0	6.0	37.0	34.2	14.0	10.8	9.2
Do	15598	♀	47.0	35.4	16.8	8.6	39.2	8.0	35.6	34.0	14.4	11.0	9.0
Wyandotte Cave	141877	♀	47.2	39.0	16.4	8.2	37.6	7.0	33.0	31.4	13.2	11.6	9.4
Do	141878	♀	47.6	37.8	15.8	8.4	39.8	7.4	36.4	34.2	14.2	12.4	9.0
Do	141879	♀	46.0	37.4	15.2	8.0	40.0	7.0	36.0	33.6	13.8	11.0	9.0
[1] Do	10980 M.C.Z.	♀	----	----	15.4	7.9	39.4	5.8	37.0	34.2	----	----	----
Kentucky:													
Mammoth Cave	82451	♂	49.0	40.8	15.0	8.2	39.4	6.6	36.4	33.6	13.6	12.4	9.2
Do	82479	♀	49.0	41.6	15.8	8.6	40.6	6.8	37.0	35.0	14.2	11.2	9.0
Do	82531	♀	45.2	37.0	14.8	7.6	39.0	6.4	35.6	33.0	13.2	11.4	9.0
Do	82536	♂	45.4	35.6	15.4	8.0	38.2	7.0	34.8	33.0	14.4	13.0	9.2
Do	82545	♀	46.0	38.4	15.4	8.0	38.4	6.0	36.2	34.0	13.4	11.2	8.6
Do	82584	♀	46.8	35.0	15.0	8.2	37.6	6.6	36.6	33.4	13.4	11.0	8.6
Do	82608	♂	48.0	43.8	17.0	8.6	40.4	7.0	38.0	35.4	13.6	11.0	9.4
Do	82612	♂	49.8	37.6	16.2	8.0	39.8	6.4	35.8	33.2	10.4	8.8	9.0
Do	82629	♂	45.6	36.0	15.8	8.2	37.2	6.2	34.0	32.4	13.2	11.2	8.4
Do	82644	♀	49.0	38.0	16.6	8.0	39.8	7.2	36.4	34.0	13.6	12.0	9.0

[1] Type.

Cranial measurements of Myotis sodalis

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Vermont:													
Proctor	206587 U.S.N.M.	♂	14.3	13.8	9.0	3.8	7.0	5.0	10.2	5.2	5.6	5.6	0
Do	206589	♂	14.2	13.5	8.3	3.7	6.9	5.0	10.2	5.3	5.3	5.6	0
Do	206591	♂	14.5	13.9	----	3.7	7.0	5.0	10.4	5.2	5.4	5.7	0
Do	206580	♀	-----	14.0	8.6	3.7	7.0	5.0	10.6	5.5	5.6	5.8	0
Do	206582	♀	14.5	14.0	8.5	3.6	6.9	5.0	10.5	5.3	5.5	5.7	0
Do	206584	♀	14.8	14.1	----	3.8	6.9	5.1	10.5	5.5	5.5	5.8	0
Do	206585	♀	14.5	13.8	----	3.6	7.0	5.0	10.6	5.2	5.6	5.8	0
Indiana:													
Wyandotte Cave	7249 F.M.	♂	15.0	14.4	9.1	3.6	6.9	4.8	11.2	5.5	5.6	5.8	1
Do	7250	♂	14.8	14.1	8.8	3.6	7.0	5.2	10.8	5.3	5.5	5.8	1
Do	7251	♂	14.4	13.9	9.0	3.7	6.8	5.0	10.6	5.3	5.5	5.7	0
Do	7254	♂	14.8	14.4	9.1	3.8	6.9	5.0	11.0	5.4	5.6	5.7	0
Do	7255	♂	14.4	13.9	----	3.7	7.1	5.0	10.8	5.5	5.6	5.7	1
Do	7256	♀	14.5	14.0	9.3	3.7	7.2	5.0	10.6	5.3	5.8	5.8	1
Do	7257	♀	14.9	14.1	9.0	3.8	7.0	4.9	10.8	5.5	5.7	6.0	1
Do	7259	♀	14.7	14.0	----	3.6	7.1	5.0	10.6	5.2	5.4	5.6	0
Do	7260	♀	14.8	14.0	----	3.8	7.0	5.0	10.6	5.3	5.5	5.7	0
Do	7261	♀	14.8	14.1	8.8	3.6	6.8	4.8	10.7	5.5	5.7	5.7	0
Do	[1] 10980 M.C.Z.	----	15.0	14.3	8.8	3.9	7.0	5.1	11.0	5.6	5.6	6.0	1
Do	10981	----	14.4	13.9	9.0	3.7	7.0	5.1	10.8	5.3	5.7	5.7	0
Do	10982	----	14.5	13.8	9.0	3.5	7.0	5.0	10.7	5.2	5.4	5.6	0
Do	10983	----	14.4	13.7	9.0	3.7	7.0	5.0	10.5	5.2	5.6	5.7	0
Do	10985	----	14.7	14.0	8.9	3.7	7.0	5.0	10.8	5.3	5.6	5.8	0
Illinois:													
Rosiclare	15824 F.M.	♂	14.6	13.7	9.0	3.7	6.9	4.6	10.6	5.3	5.5	5.7	0
Do	15825	♂	14.5	14.0	----	3.7	6.9	4.7	10.5	5.2	5.6	5.5	1
Do	15826	♀	14.7	14.0	----	3.7	7.1	5.1	11.0	5.4	5.5	5.6	3
Do	15827	♀	14.6	14.0	----	3.7	6.9	4.9	10.6	5.3	5.8	5.8	2
Do	15828	♀	15.0	14.4	----	3.7	6.9	4.8	10.7	5.4	5.5	5.8	1
Do	15829	♀	14.9	14.1	----	3.8	7.0	5.0	11.2	5.6	6.0	6.0	2
Kentucky:													
Mammoth Cave	82530 U.S.N.M.	♂	14.0	13.5	----	3.7	6.9	5.1	10.4	5.2	5.5	5.7	2
Do	82557	♂	14.6	13.8	9.1	3.6	7.0	5.0	10.6	5.2	5.5	5.6	3
Do	82595	♂	14.5	14.0	8.9	3.7	6.9	5.0	10.9	5.2	5.5	5.6	3
Do	82598	♂	15.0	14.2	9.0	3.8	6.8	5.0	10.8	5.5	5.6	5.8	0
Do	82609	♂	14.5	14.0	8.6	3.6	6.9	4.9	10.6	5.2	5.4	5.5	1
Do	82519	♀	14.3	13.6	----	3.6	6.9	5.0	10.5	5.4	5.6	5.6	1
Do	82534	♀	14.5	13.7	8.6	3.9	6.9	4.9	10.5	5.4	5.7	5.9	2
Do	82543	♀	14.4	13.8	8.8	3.7	7.0	5.0	10.5	5.2	5.3	5.6	1
Do	82599	♀	14.4	13.8	----	3.7	7.0	5.0	10.5	5.4	5.7	5.7	0
Do	82567	♀	14.3	13.5	8.4	3.7	6.6	5.0	10.4	5.3	5.5	5.8	0
Tennessee:													
Hickman County	4191 A.M.N.H. 3223	♂	14.6	14.0	8.8	3.9	7.0	5.1	10.4	5.4	5.6	5.7	0
Arkansas:													
Greenway	5831 F.M.	♂	14.5	13.7	----	3.7	6.8	5.1	10.0	5.2	5.4	5.6	0

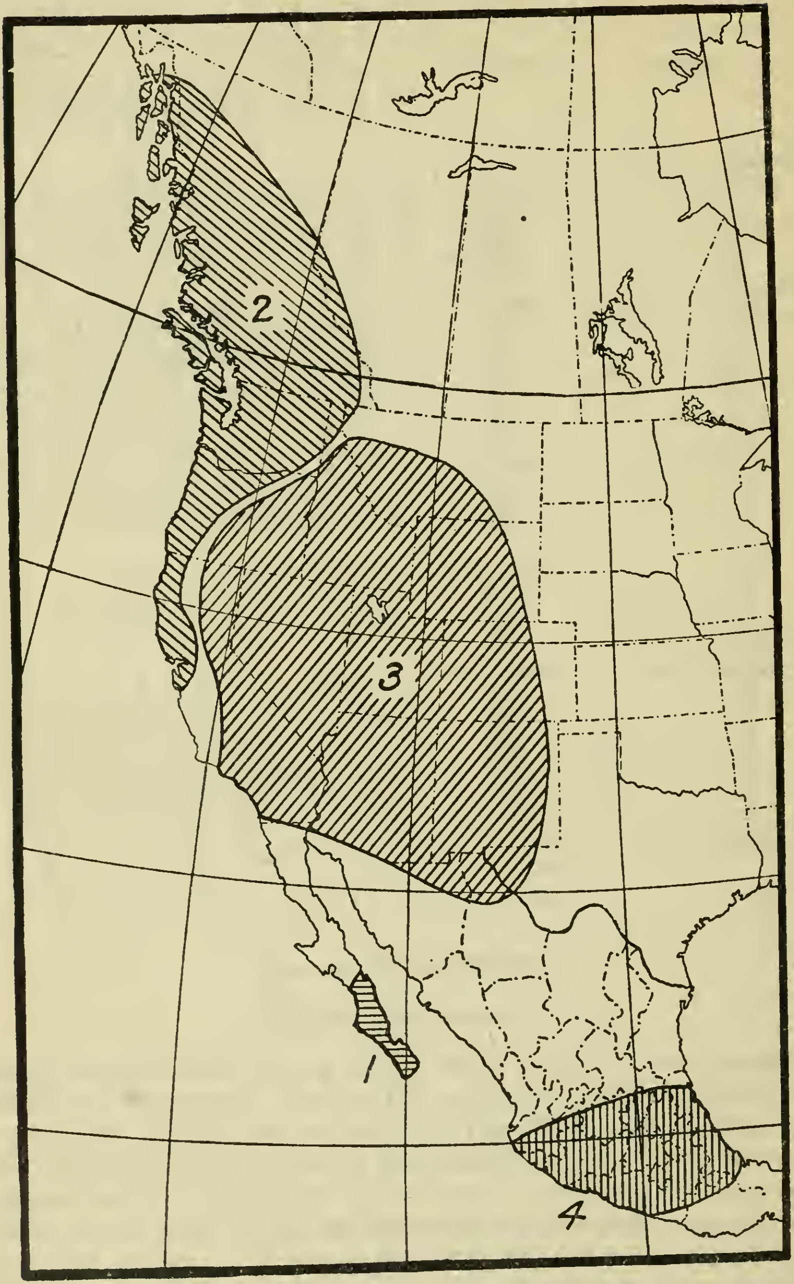
[1] Type.

MYOTIS VOLANS (H. Allen)

(Synonymy under subspecies)

Distribution.—Western North America from southwestern Alaska (Admiralty Island) to the tip of the Lower Californian peninsula and southern Mexico (Vera Cruz), thence eastward into the wooded parts of Arizona, New Mexico and Colorado, Nevada, Idaho, and Wyoming. Apparently forest-loving, preferring high open woods.

Diagnosis.—Small or medium-sized bats, the forearm 35 to 41 mm.; total length about 83 to 95 mm., tail usually 42 to 46 mm., the ratio of its length to head and body averaging 92.4 in 10 specimens from Nicasio, Calif., and 94.1 in 10 specimens from interior localities. Skull with short rostrum, high forehead, and convex temporal ridges,



Map 10.—Distribution of Myotis volans: 1, M. volans volans; 2, M. volans longicrus; 3, M. volans interior; 4, M. volans amotus

its greatest length 12.2 to 15.0 mm.; maxillary tooth row ranging from 4.5 to 6 mm.; lower tooth row (excluding incisors) 4.9 to 6 mm. Ears low and bluntly rounded, barely reaching the nostril when laid forward. Foot decidedly less than one-half the length of tibia, the ratio of its length to that of tibia about 41; calcar distinctly keeled. Fur on the under side of wing membrane extending out to the level of the elbow.

Ears.—The ear is short, barely reaching the nostril when laid forward, its anterior margin strongly convex, its upper half beveled abruptly backward to the broadly rounded tip. Tragus short, about half the height of ear from meatus (5:10 mm.); at its base a small rounded lobe, above which the anterior and posterior margins continue nearly parallel half way to the tip whence the posterior outline is sharply beveled forward to the tip.

Wing and membranes.—The wing membranes arise from the base of the toes. Third metacarpal longest; second, fourth, and fifth about equal, or the two latter graduated so that 4 is shorter than 3, and 5 is shorter than 4. When folded the third metacarpal falls 1 to 1.5 mm. short of the elbow. Taking the third finger as 100, the fourth is 83, the fifth 77 (66:55:51 mm.; specimen from Menlo Park, Calif.). Tail involved in membrane except at its extreme tip, where the terminal vertebra alone projects. Free border of uropatagium without fringing hairs.

Foot.—The foot is delicately formed, its length decidedly less than half the length of the tibia (ratio of foot to tibia in 2 specimens from Lower California 40.8; in 10 specimens from Nicasio, Calif., 41.7; in 10 from localities within the area inhabited by the interior race, 40.7). Calcaneum about as long as the free edge of the uropatagium, ending in a distinct but minute lobule. At about the length of the tarsus from the ankle, a low elongate keel arises.

Fur.—Pelage full and long, about 7 mm. on lower back. Above, the hair extends out on to the interfemoral membrane over an area approximately the length of the femur. Below, the wing membrane is usually well furred as far out as a line joining the elbow and the knee. Membranes blackish brown.

Skull.—The skull is of characteristic form, small and delicate with the rostrum shortened and the profile of the brain case elevated abruptly, giving a "pug-nosed" effect (pl. 1, p. 7, fig. 10). Occiput high and slightly inflated. Temporal ridges slightly developed but usually traceable with a lens. They unite to form a low sagittal crest anterior to the occiput. Posterior to this point of union they bow outward, to continue back with a rather characteristic outline, cutting off a somewhat triangular area whose sides are convex instead of straight or concave. The lambdoid crests are transverse, sometimes meeting at the occiput to form a short, backwardly directed angle.

Teeth.—Molars proportioned to palate about as in *Myotis lucifugus.* The secondary cusps and ridges show an obvious tendency to reduction; protoconule often less well developed than in *Myotis lucifugus*, sometimes reduced to a mere thickening of the anterior margin of the crown; metaloph usually present but rarely if ever long enough to reach the crest of the ridge connecting protocone with hypocone; cingulum as in *M. lucifugus.* The two small upper premolars are nearly equal in cross-section; the posterior, however, is slightly the smaller and about two-thirds the height of the anterior tooth. They are usually both drawn slightly in from the tooth row, the second commonly more than the first, though in some individuals they are nearly in the row, and again the second may be so crowded inward as hardly to be visible from the exterior. The premolars of the lower jaw stand completely in the tooth row without crowding, the first with a cross-section about one-third greater than the second, which stands about two-thirds as high. As in *Myotis lucifugus* the width of palate including the upper molars slightly exceeds the length of the maxillary tooth row (front of canine to back of last molar), and about equals the length of the mandibular tooth row (excluding incisors).

Remarks.—This species, though superficially resembling *Myotis lucifugus*, is very distinct from other American bats. Its short rounded ears, small foot, well-developed calcaral keel and obvious extension of the fur on the ventral side of the membranes to a line joining the elbow and knee, are characters which, combined, distinguish it at once externally. The skull is further diagnostic with its shortened rostrum and large, high brain case, with the convex outlines of the temporal ridges meeting at the occiput.

Little is known concerning the habits of *Myotis volans.* It seems to frequent open forest, ranging in summer to an altitude of at least 11,000 feet in the Sierra Nevada. Apparently it is not social to any great degree and in general it seems to avoid caves. Dr. Joseph Grinnell notes a specimen with a single fetus taken at Santa Rosa Peak, Calif.; a female from Anatone, Wash., June 23, also contained a single young.

The specimen on which Harrison Allen, in 1866, based his *Vespertilio volans* was for many years lost sight of. The name was for a time relegated to the synonymy of *Myotis californicus* (Miller, 1897). It was not until 1914 that Goldman, on reexamining the type, found it to be a representative of the species whose characters had been first clearly indicated by True, in 1886, under the specific name *longicrus.* Both names, however, remain in use, as they were applied to different subspecies. Miller, in 1897, regarded this species as a form of *Myotis* *lucifugus*, but in 1914 he showed that it is distinct. Four subspecies are now recognized.

MYOTIS VOLANS VOLANS (H. Allen)

Vespertilio volans H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 282.—Dobson, Catal. Chiroptera Brit. Mus., p. 329, 1878.—H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 94, March 14, 1894 (as synonym of "*Vespertilio nitidus*"=*californicus*).—Miller, North Amer. Fanua, No. 13, p. 69, October 16, 1897 (as synonym of *Myotis californicus*).—Lyon and Osgood, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 273, January 28, 1909.

Myotis capitaneus Nelson and Goldman, Proc. Biol. Soc. Washington, vol. 22, p. 28, March 10, 1909 (San Jorge, near Comondu, Lower California).—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 56, December 31, 1912.—Goldman, Proc. Biol. Soc. Washington, vol. 27, p. 102, May 11, 1914.

Myotis volans Goldman, Proc. Biol. Soc. Washington, vol. 27, p. 102, May 11, 1914.—Miller, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 71, April 29, 1924.

Type locality.—Cape St. Lucas, Lower California, Mexico.

Type specimen.—Adult female in alcohol, No. 5398, United States National Museum, collected at Cape St. Lucas, Lower California, Mexico, by John Xantus. According to Lyon and Osgood, in 1909, the alcoholic portion of the type could not then be found; it appears, however, to be in the Academy of Natural Sciences at Philadelphia.

Distribution.—So far as known the typical form is confined to Lower California. (See map 10, p. 136.)

Diagnosis.—Size smallest of the races, forearm about 35 mm., tibia 17. Skull delicately formed, distinctly smaller than in the other subspecies, its greatest length less than 13 mm.

Description.—Color above a clear reddish buff—about " clay color " of Ridgway with a tinge of cinnamon—slightly paler on the head and neck; below dull whitish washed with buffy; the bases of the hairs both above and below plumbeous black, except ventrally along the borders of the membranes where the dark bases are lacking. Tips of the hairs above only slightly glossy; membranes dark blackish brown. There is no dark spot at the shoulder.

In color the only available skin (type of *Myotis capitaneus*) differs very little if at all from the type of the race *interior*, which, however, is the brightest of the series representing that subspecies.

Measurements.—For measurements see tables, pages 146 and 147.

Specimens examined.—Total number 6, from the following localities:

LOWER CALIFORNIA: Cape St. Lucas, 1 skull, type (U.S.N.M.), 1 alc. without skull, type (A.N.S.P.); San Jorge, 1 skin, type of *capitaneus* (U.S.N.M.); Santa Anita, 4 alc., all but one immature (U.S.N.M.).

MYOTIS VOLANS LONGICRUS (True)

Vespertilio longicrus True, Science, vol. 8, p. 588, 1886.

Vespertilio lucifugus C. H. Townsend, Proc. U. S. Nat. Mus., vol. 10, p. 182, 1887 (see H. W. Grinnell, 1918).

Vespertilio nitidus longicrus H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 103, March 14, 1894.—Trouessart, Catal. Mamm. viv. foss., p. 130, 1897.

Myotis lucifugus longicrus Miller, North Amer. Fauna, No. 13, p. 64, October 16, 1897.—Trouessart, Catal. Mamm. viv. foss., p. 1284, 1899.—Merriam, North Amer. Fauna, No. 16, p. 89, October 28, 1899.—Elliot, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 402, March, 1901.—Elliot, List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901.—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 256, December 27, 1901.—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 581, 1904.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 92, 1904.—Stone, Proc. Acad. Nat. Sci. Philadelphia (July, 1904), p. 579, October 17, 1904.—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 479, 1905 (part).—Stephens, California Mammals, p. 265, 1906 (part).—Seton, Life Hist. Northern Anim., p. 1148, 1909 (part).—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 55, December 31, 1912.—J. Grinnell, Proc. California Acad. Sci., ser. 4, vol. 3, p. 276, August 28, 1913 (part).—Bailey, Wild Anim. Glacier Nat. Park (Dept. of the Interior; Nat. Park Service), p. 100, 1918.

Myotis longicrus Lyon and Osgood, List Type-sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 271, January 28, 1909 (combination wrongly attributed to True).—Dice, Journ. Mamm., vol. 1, p. 11, November 28, 1919.

Myotis longicrus longicrus Miller, Proc. Biol. Soc. Washington, vol. 27, p. 211, October 31, 1914.—H. W. Grinnell, Univ. California Publ. Zool., vol. 17, p. 267, January 31, 1918; Univ. California Publ. Zool., vol. 17, p. 431, April 25, 1918.—J. Grinnell, Univ. California Publ. Zool., vol. 21, p. 314, January 27, 1923.—Miller, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 68, April 29, 1924.—Grinnell and Storer, Anim. Life in the Yosemite, p. 56, 1924.

Myotis altifrons Hollister, Smithsonian Misc. Coll., vol. 56, No. 26, p. 3, December 5, 1911 (Henry House, Alberta, Canada).—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 56, December 31, 1912.—Hollister, Canadian Alpine Journ., special number (1912), p. 7, February 17, 1913.—Miller, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 69, April 29, 1924.

Type locality.—Vicinity of Puget Sound, Wash.

Type specimen.—Subadult female in alcohol (skull removed), No. $\frac{15623}{22490}$, United States National Museum, from "the vicinity of Puget Sound," Washington. David Starr Jordan, collector. Though not designated by number in the original description, the single specimen which served as the basis for the name is clearly identifiable in the United States National Museum (see Lyon and Osgood, 1909).

Distribution.—Humid coast region from Admiralty Island, Alaska, south to Monterey County, Calif. (see map 10, p. 136).

This is the dark form of the humid coast region of the Northwest. The most northerly locality known for it is Mole Harbor, Admiralty Island, in southwestern Alaska, whence the University of California has a specimen taken June 9, 1907. Thence southward it occurs in British Columbia as well as in western Alberta, where at Henry House, the type specimen of *Myotis altifrons* was captured. This last, however, proves to be inseparable from *M. v. longicrus.* Southward again, typically dark examples are found from the Cascade Range to the coast in the western half of Washington and Oregon, while in California it is present coastwise in Humboldt, Mendocino, Sonoma, and Marin Counties as far south at least as San Mateo and Monterey Counties. Inland from this area there is a lessening of the saturate appearance, and adult specimens show a distinctly lighter or ochraceous-tawny cast. This is true of skins from eastern Oregon, and the Sierra Nevada of California from Mount Shasta southward to Mount Whitney. These are more or less intermediate between *M. v. longicrus* and *M. v. interior*, and occasional specimens from the central portions of the Sierra may be referred with almost equal propriety to either form, as has been shown by Mrs. Grinnell (1918, for Mono County). On the whole, however, the Sierra Nevada series seem best placed with the brighter race, *interior.* Immature individuals are, of course, much darker than adults and lack almost entirely the ruddy golden tint of adults of *M. v. interior*, so that their general appearance is nearly as in worn adults of *M. v. longicrus.*

Diagnosis.—Darkest of the subspecies, general color dark reddish brown above, smoky below; size greater than in typical *Myotis volans* (forearm 37 to 40; tibia 18 to 19.6; greatest length of skull 13.7 to 14.6 mm.).

Color.—In fresh unworn pelage the tips of the longer hairs are a very dark reddish brown above—near cinnamon brown of Ridgway—recalling the color of *Myotis lucifugus lucifugus;* below, smoky brown, paler posteriorly; the bases of the hairs blackish; ears and membranes blackish.

Most of the skins available were collected in late summer and seem to have lost much of the long reddish tips of the hairs through wear, and in general are a dark smoky brown (a little darker than Prout's brown), paler below.

A specimen from Admiralty Island, Alaska, is blackish brown with very little of the cinnamon tipping on the back, but is closely matched by some of the skins from Washington.

Measurements.—For measurements, see tables, pages 146 and 147.

Specimens examined.—Total number 127, from the following localities:

ALASKA: Admiralty Island, Mole Harbor, 1 skin (U.C.).
ALBERTA: Henry House, 1 skin, type of *altifrons* (U.S.N.M.).

BRITISH COLUMBIA: Cranbrook, 1 skin, not typical (Garret); Vancouver Island, Errington, 1 skin (U.C.).

CALIFORNIA: Cazadero, Sonoma County, 1 skin, not typical (U.C.); Chalk Peak, Monterey County, 1 skin (U.C.); Guerneville, Sonoma County, 2 skins (U.C.); Hurleton, Butte County, 1 skin, nearly typical (U.S.N.M.); Menlo Park, San Mateo County, 2 alc. (U.S.N.M.); Mount Sanhedrin, Mendocino County, 1 skin (A. N. S. P.); Mount Veeder, Sonoma County, 1 skin, nearly typical (U.S.N.M.); Nicasio, Marin County, 2 skins, 71 alc. (U.S.N.M.), 1 alc. (B.M.); Pacheco Pass, Santa Clara County, 1 skin (U.S.N.M.); Pescadero Creek, San Mateo County, 1 skin (U.C.); Point Reyes, Marin County, 1 alc. (U.S.N.M.); Sherwood, Mendocino County, 1 skin (U.C.).

OREGON: Baker County, 2 alc. (U.S.N.M.); Cascade Mountains, eastern base, 1 skin (U.S.N.M.); McKenzie Bridge, 3 skins (U.S.N.M.).

WASHINGTON: Bartholomew (Blue Mountains), 10 skins (S. H. Lyman); Beaver Creek, Whatcom County, 1 skin (U.S.N.M.); Bumping Lake, Yakima County, 1 skin, 1 alc. (U.S.N.M.); Carson, 2 skins (U.S.N.M.); Chilliwack River, Whatcom County, 1 skin (U.S.N.M.); Entiat, 1 alc. (U.S.N.M.); Godman Springs (Blue Mountains), 6 skins (S. H. Lyman); Kirkland, 1 skin (U.S.N.M.); Lake Cushman (Mason County), 1 alc. (U.M.); Mount Angeles, Clallam County, 1 skin (U.S.N.M.); Mount Rainier, 1 skin (U.S.N.M.); Oroville, 1 alc. (U.S.N.M.); Port Townsend, 1 alc. (U.S.N.M.); Puget Sound, 1 alc., type (U.S.N.M.).

MYOTIS VOLANS INTERIOR Miller

Myotis lucifugus longicrus MILLER, North Amer. Fauna, No. 13, p. 64, October 16, 1897 (part).—TROUESSART, Catal. Mamm. viv. foss., p. 1284, 1899 (part).—ELLIOT, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 402, March, 1901 (part); List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901 (part).—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 256, December 27, 1901 (part).—ELLIOT, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 581, 1904 (part).—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 92, 1904 (part).—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 479, 1905 (part).—STEPHENS, California Mammals, p. 265, 1906 (part).—J. GRINNELL, Univ. California Publ. Zool., vol. 5, p. 158, December 31, 1908.—YOUNG, Proc. Acad. Nat. Sci. Philadelphia, p. 408, October 14, 1908.—SETON, Life-Hist. Northern Anim., p. 1148, 1909 (part).—WARREN, Mammals of Colorado, p. 273, 1910.—CARY, North Amer. Fauna, No. 33, p. 206, August 17, 1911.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 55, December 31, 1912 (part).—GRINNELL and SWARTH, Univ. California Publ. Zool., vol. 10, p. 380, October 31, 1913.—J. GRINNELL, Proc. California Acad. Sci., ser. 4, vol. 3, p. 276, August 28, 1913 (part).

Myotis longicrus interior MILLER, Proc. Biol. Soc. Washington, vol. 27, p. 211, October 31, 1914.—H. W. GRINNELL, Univ. California Publ. Zool., vol. 17, p. 271, January 31, 1918.—G. M. ALLEN, Journ. Mamm., vol. 1, p. 4, November 28, 1919.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 69, April 29, 1924.

Type locality.—Twining, Taos County, New Mexico.

Type specimen.—Adult male (skin and skull), No. 133426, United States National Museum (Biological Survey collection), collected at Twining, Taos County, New Mexico, July 23, 1904, by Vernon Bailey. Original number 8182.

Distribution.—More arid parts of the species' range from eastern Washington and Oregon to Wyoming, south to Colorado, New Mexico, northern Chihuahua and southern California. (See map 10, p. 136.)

Diagnosis.—Size essentially as in *Myotis volans longicrus;* color lighter and more yellowish.

Color.—Nearly "ochraceous-buff" to "ochraceous-tawny" above, pale buffy below; the bases of the hairs everywhere blackish brown. Ears and membranes blackish.

Measurements.—For measurements see tables, pages 146 and 147.

Specimens examined.—Total number 123, from the following localities:

ARIZONA: Chiricahua Mountains, 1 skin (U.S.N.M.), 1 skin (F. M.); Cooley's, White Mountains, 1 skin (A. M. N. H.); Fort Whipple, 1 skin (U.S.N.M.); Keam Canyon, 1 skin (U.S.N.M.); Little Spring, near Flagstaff, 2 skins, 1 alc. (U.S.N.M.); San Francisco Mountain, 1 alc. (U.S.N.M.); Santa Rita Mountains, 1 skin (U.S.N.M.).

CALIFORNIA: Benton, Mono County, 1 skin (U. C.); Cabazon, Riverside County, 1 skin (U. C.); Cuyamaca Mountains, San Diego County, 1 skin (U. C.); Dudley, Mariposa County, 4 skins (U. C.); Dulzura, San Diego County, 1 alc. (A. N. S. P.); Dutch Flat, Placer County, 1 skin (U. C.); Fort Tejon, Kern County, 6 skins (F. M.); Fyffe, Eldorado County, 2 skins (U. C.); Hot Springs Pass, Mono County, 1 skin (M. C. Z.); Independence, Inyo County, 1 skin (U. C.); Inyo Mountains, 2 skins (F. M.); Kearsage Pass, Inyo County, 1 skin (U. C.); Little Onion Valley, Inyo County, 3 skins (U. C.); Los Angeles, 1 alc. (U.S.N.M.); Monache Meadows, Tulare County, 1 skin (U. C.); Mount Lassen, 1 alc. (U.S.N.M.); Mount Shasta, 1 skin (U.S.N.M.); Mount Whitney, 2 skins (M. C. Z.), 5 skins (F. M.); Nevada City, Nevada County, 1 alc. (U.S.N.M.); Owens Lake, 1 alc. (U.S.N.M.); Pasadena, 2 skins (U. C.); Panamint Mountains, Inyo County, 4 skins (U. C.); Pine Creek, Lassen County, 2 skins (U.S.N.M.); San Bernardino Mountains, 3 skins (U. C.), 1 skin (A. N. S. P.); San Emigdio, Tulare County, 1 alc. (U.S.N.M.); San Jacinto Mountains, 1 alc. (U.S.N.M.); Santa Rosa Peak, San Bernardino County, 3 skins (U. C.); Walker Pass, Eldorado County, 1 alc. (U.S.N.M.); White Mountains, Inyo County, 5 skins (U. C.).

CHIHUAHUA: Colonia Garcia, 1 skin, approaching *amotus* (U.S.N.M.); San Luis Mountains, 1 skin (U.S.N.M.).

COLORADO: Coventry, 1 skin (U.S.N.M.); Grand Junction, 1 alc. (U.S.N.M.).

IDAHO: Inkom, 1 skin (U.S.N.M.); Malad, 1 skin (U.S.N.M.); Mission, 1 alc. (U.S.N.M.); Snake River desert, 3 skins (U.S.N.M.); Warren, 1 skin (U.S.N.M.).

MONTANA: Buffalo, 1 skin (U.S.N.M.); Emigrant Gulch, 1 skin, not typical (U.S.N.M.); Florence, 1 skin (U.S.N.M.).

NEVADA: Cottonwood Range, 1 skin (U.S.N.M.); Humboldt County, 1 skin (U. C.); Panaca, 1 alc. (U.S.N.M.).

NEW MEXICO: Raton Range, 1 skin (U.S.N.M.); Cantonment Bergwyn, 1 alc. (U.S.N.M.); Costilla River, 2 skins (U.S.N.M.); Santa Clara Canyon, 1 skin (U.S.N.M.); Santa Fe, 1 alc. (U.S.N.M.); Twining, 5 skins, including type (U.S.N.M.); Willis, 2 skins (U.S.N.M.).

OREGON: Fremont, 5 skins, 1 skull, approaching *longicrus* (U.S.N.M.); Paulina Lake, 4 skins (U.S.N.M.); Silver Lake, 1 skin (U.S.N.M.); Ironside, Malheur County, 1 skin (A. M. N. H.).

WASHINGTON: Anatone, 4 skins (U.S.N.M.).

WYOMING: Afton, 1 skin (U.S.N.M.); Lake Fork, 1 alc. (U.S.N.M.); Laramie, 1 skin (U.S.N.M.); Otto, 2 skins (A. M. N. H.); Rattlesnake Mountains, 1 skin (U.S.N.M.).

Remarks.—The type specimen of *Myotis volans interior* is a bright ochraceous buffy identical in color with the type of *Myotis* "*capitaneus*" representing the small *M. volans volans* of Lower California. Others from New Mexico, however, are much redder, ochraceous tawny. Palest of all are skins of adults from the Inyo Mountains of southeastern California and a single skin from 11,000 feet on the east side of Mount Whitney at the southern end of the Sierra Nevadas. These are probably the extreme of this pallid dry-country race, the Mount Whitney specimen perhaps a summer immigrant from the deserts below. Specimens from Pasadena, Pasadena County, southward to southern California seem best regarded as *interior*, as well as the majority of those from the Sierra Nevada, particularly the more pallid individuals from its southern part. The series from the Sierra Nevada is clearly intermediate between the interior race and *M. volans longicrus* of the coast, but most of them have a distinctly tawny hue, instead of the saturate appearance of the latter, and it is for this reason that we have included them under the form *interior*. A small series from Old Fort Tejon, Kern County, Calif., is darker than most specimens of *interior*, yet not so dark as *M. v. longicrus*. In the drier parts of eastern Washington similar dull yellowish-brown individuals are found. Three from Anatone in the extreme southeast corner of the State are clearly *interior* rather than the saturate smoky form of the coast, while of two from Whatcom County, one is as dark as *M. v. longicrus* and the other shows an approach to *interior* in its decidedly redder cast. Eastern Oregon affords a similar series, which, on account of their distinctly paler and reddish to ochraceous tint are placed with the latter form, though clearly intermediates.

In immature specimens the bright tips of the long hairs are few and shorter than in adults, so that the bases of the hairs everywhere show through and darken the general appearance. The pallid coloration of Colorado specimens was noticed by Cary (1911). No. 160595 (U.S.N.M.), from Wyoming, lacks the minute p^3 on the left-hand side. The other small premolar nearly fills the space between canine and p^4.

MYOTIS VOLANS AMOTUS Miller

Myotis lucifugus longicrus Miller, North Amer. Fanua, No. 13, p. 65, October 16, 1897 (part; specimen from Vera Cruz).

Myotis longicrus amotus Miller, Proc. Biol. Soc. Washington, vol. 27, p. 212, October 31, 1914; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 69, April 29, 1924.

Type locality.—Cofre de Perote, Vera Cruz, Mexico. Altitude 12,500 feet.

Type specimen.—Adult female, skin and skull, No. 54437, United States National Museum, from Cofre de Perote, Vera Cruz, Mexico. Collected May 27, 1893, by E. W. Nelson.

Distribution.—Southern Mexico, including the States of Vera Cruz and Jalisco; limits of range as yet undetermined. (See map 10, p. 136).

Diagnosis.—Similar in size and general coloration to the race *interior*, but the tints of back and belly much richer in tone.

Color.—The color of the fur is nearly "ochraceous tawny" above, and "cinnamon brown" below even to the fur about the anal region which in *M. v. interior* is usually whitish.

Skull.—The skull of the type seems a trifle longer with a narrower brain case and longer rostrum than in specimens of *M. v. longicrus*, while from typical *volans* it differs in larger size and less shortened rostrum.

Measurements.—For measurements see tables, pages 146 and 148.

Specimens examined.—Total number 3, from the following localities;

JALISCO: Los Masos, 2 skins (A. M. N. H.).
VERA CRUZ: Cofre de Perote, 1 skin, the type (U. S. N. M.).

Remarks.—This Mexican form of *Myotis volans* is of a richer tone throughout than those whose ranges lie immediately to the north, but it is not darkened to the extent seen in *Myotis volans longicrus* of the humid northwest coast. The pecularities in color were noticed by Miller (1897) in his review of the North American Vespertilionidæ, but the race was not formally separated until 1914. Specimens from northern Chihuahua and Sonora, Mexico, although approaching *Myotis volans amotus*, seem to be best referred to *M. v. interior* which they resemble in the golden hue of the long glossy tips of the hairs above, and in the paler color below, becoming whitish or buffy about the anal region.

External measurements of Myotis volans

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis volans volans													
Lower California:													
Santa Anita	148361	♂	44.4	40.8	17.0	7.2	35.2	5.0	34.2	32.0	11.8	9.0	7.6
San Jorge	[1] 146046	♂	47.2	29.4	19.2	7.6	35.2	5.2	33.8	31.8	-----	-----	----
Myotis volans longicrus													
Alberta: Henry House	[2] 174133	♂	"49"	"39.5"	18.8	----	37.0	6.4	33.4	31.0	-----	-----	----
Washington:													
Puget Sound	[3] $\frac{15823}{22480}$	♀	44.8	46.2	19.6	7.4	39.6	6.4	37.0	35.0	12.0	9.8	8.4
Port Townsend	16427	♂	47.8	42.8	18.8	8.0	40.0	5.8	37.0	35.0	13.0	9.8	9.2
Oregon: Baker County	144482	♂	45.2	42.2	18.8	8.0	39.0	6.8	36.0	34.0	12.8	10.0	8.4
California:													
Menlo Park	142541	♂	47.2	46.2	18.6	7.4	39.2	6.2	38.0	34.4	12.6	10.8	8.4
Do	142542	♀	43.0	41.0	19.2	8.0	38.6	6.4	37.0	34.8	12.4	10.2	8.2
Nicasio	59490	♀	51.2	48.2	19.0	7.4	38.6	6.2	37.0	34.2	13.0	10.4	8.6
Do	59495	♂	46.8	42.8	18.0	7.2	38.0	6.0	36.0	33.4	11.0	10.0	9.0
Do	59557	♂	47.8	40.4	18.0	8.0	39.4	7.0	37.2	34.4	13.0	11.4	9.0
Do	59560	♀	43.0	42.2	18.4	7.6	39.4	6.0	37.0	34.2	12.8	10.0	9.0
Do	59562	♀	48.2	43.4	18.4	8.2	38.0	6.4	36.4	34.2	11.8	10.2	9.0
Do	59564	♀	48.8	45.8	18.2	7.0	38.6	6.0	36.8	33.4	12.6	11.0	9.0
Do	59566	♂	51.8	43.8	19.2	8.0	39.0	6.4	37.8	34.6	12.0	10.0	9.2
Do	59568	♂	49.6	45.6	18.4	8.0	39.0	6.0	36.8	34.8	13.0	10.8	8.4
Do	59569	♂	48.0	39.4	18.8	8.2	38.2	6.0	36.8	34.0	11.8	9.8	8.2
Do	59573	♂	48.0	44.6	18.2	7.4	37.0	6.2	35.0	33.6	12.0	10.4	8.0
Myotis volans interior													
Wyoming: Lake Fork	55847	♂	51.0	47.0	20.0	8.2	39.0	7.0	38.6	-----	13.8	13.2	8.4
Colorado: Grand Junction	54846	♀	47.4	45.6	19.0	8.4	40.0	5.6	37.8	35.6	14.0	11.4	8.6
New Mexico: Cantonment	5374	♂	48.4	42.6	19.0	7.8	39.0	6.8	36.0	34.6	13.6	10.6	9.0
Arizona:													
Little Spring	203098	♀	50.0	49.0	20.0	8.4	37.4	6.8	36.8	35.0	11.8	9.4	8.2
San Francisco Mountain	18694	♀	50.0	45.8	18.4	8.2	39.8	6.4	38.0	36.2	13.0	10.2	8.2
New Mexico: Twining	[3] 133426	♂	52.8	38.2	18.6	8.0	38.0	6.4	36.0	35.2	-----	-----	----
Nevada: Panaca	28950	♂	46.4	45.4	18.2	8.0	41.0	5.8	38.2	36.0	12.0	10.0	7.2
California:													
Los Angeles	92063	♂	47.2	44.4	19.0	7.6	40.0	6.2	36.8	35.0	12.4	8.4	7.0
Mount Lassen	125794	♀	46.2	42.8	19.0	7.2	39.0	5.2	37.8	34.4	12.8	10.2	7.2
Nevada City	53124	♀	51.0	46.4	20.0	7.4	40.6	6.2	39.2	36.8	13.0	11.0	8.0
Owens Lake	28951	♀	46.6	46.8	-----	7.0	-----	6.4	38.8	36.0	13.4	11.6	9.0
San Jacinto Mountain	62869	♂	48.8	46.0	18.0	7.4	38.4	6.0	36.4	34.6	13.2	9.6	9.2
San Emigdio	31569	♀	53.4	44.8	19.4	8.4	40.4	5.2	38.0	36.4	11.6	9.0	7.4
Walker Pass	29809	♀	50.0	43.4	20.0	7.2	41.2	6.8	38.0	36.2	13.2	11.0	9.0
Myotis volans amotus													
Vera Cruz: Cofre de Perote	[3] 54437	♀	54.0	35.0	18.2	8.0	40.0	5.0	37.8	35.2	-----	-----	----

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[1] Type of *Myotis capitanens* Nelson and Goldman.
[2] Type of *Myotis altifrons* Hollister.
[3] Type.

Cranial measurements of Myotis volans

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis volans volans													
Lower California:													
Cape St. Lucas	[1] 37326	------	12.4	12.0	8.0	----	7.0	5.0	8.8	4.6	5.0	5.0	1
San Jorge	[2] 146046	♂	12.6	12.0	----	3.8	7.0	5.0	8.8	4.8	----	5.0	0
Santa Anita	148358	imm.	12.2	12.0	----	3.6	6.7	5.2	9.0	4.6	4.9	4.9	0
Do	148361	imm.	-----	12.0	----	4.0	6.9	5.0	9.0	----	4.8	4.9	0
Myotis volans longicrus													
Alaska: Admiralty Island	186 U.C.	♂	14.5	14.0	9.0	4.0	7.4	5.6	10.5	5.3	5.8	5.7	1
Alberta: Henry House	[3] 174133	♂	14.4	13.6	8.8	4.0	7.6	5.4	10.2	5.2	5.7	5.8	2
British Columbia: Vancouver Island	2588 U.C.	♀	14.2	13.2	8.7	3.8	7.4	5.2	10.0	5.0	5.7	5.4	1
Washington:													
Puget Sound	[1] 22480	♀	14.0	13.6	8.8	3.9	7.2	5.6	10.3	5.2	5.6	5.6	0
Port Townsend	38606	♂	14.1	13.6	9.0	----	7.4	5.2	10.0	5.2	5.6	5.6	0
Mount Ranier	233042	♂	14.1	13.8	8.5	3.8	7.0	5.4	-----	5.2	5.6	----	0
Do	233043	♂	14.3	13.8	9.0	4.2	7.4	5.6	10.0	5.2	5.6	5.6	0
Kirkland	171157	♀	13.7	13.0	8.6	3.8	7.2	5.2	9.8	5.0	5.6	5.6	1
Carson	230161	♂	14.1	13.3	----	3.9	7.2	5.5	10.1	5.0	5.5	5.4	0
Do	230162	♂	13.8	13.2	8.6	4.0	7.1	5.5	10.0	5.2	5.8	5.6	1
Chilliwack River	234920	♂	14.0	13.6	----	3.8	7.0	5.1	10.0	5.2	5.5	5.6	0
Beaver Creek	234923	♀	14.6	14.2	9.0	4.1	7.5	5.4	10.7	5.6	5.9	5.9	0
Blue Mountains	B41 Lyman	♂	13.8	13.2	8.6	4.2	7.2	5.2	10.0	5.2	5.8	5.6	3
Do	C 19	♂	14.2	13.6	----	4.0	7.2	5.4	10.2	5.2	5.8	5.8	0
Do	C 24	♂	13.8	13.0	----	4.0	7.2	5.4	10.0	5.0	5.6	5.6	0
Do	C 48	♂	13.8	13.4	9.0	4.0	7.4	5.8	10.0	5.2	6.0	5.6	2
Do	C 17	♀	14.2	13.8	----	4.0	7.4	5.4	10.0	5.4	6.0	5.8	2
Do	C 27	♀	13.8	13.2	----	4.0	7.2	5.2	10.0	5.2	5.8	5.6	0
Do	C 53	♀	14.2	13.6	8.8	4.0	7.0	5.0	10.0	5.2	5.6	5.6	2
Oregon: Sparta, Baker County	144482	♂	14.0	13.0	8.2	4.0	7.0	5.2	-----	5.2	5.4	---	0
California:													
Nicasio	60478	♂	14.1	13.2	8.8	4.0	7.2	5.2	10.0	5.2	5.7	5.8	1
Do	59570	♂	13.9	13.2	8.4	4.0	7.4	5.4	9.8	5.0	5.7	5.4	0
Do	60475	♂	14.0	13.6	----	5.0	7.4	5.6	10.0	5.0	5.7	5.6	1
Do	60476	♂	14.1	13.6	8.4	5.0	7.2	5.4	10.0	5.2	5.7	5.6	1
Do	60461	♀	14.0	13.6	8.6	5.2	7.2	5.2	10.0	5.2	5.6	5.8	0
Do	60473	♀	14.1	13.6	8.8	5.0	7.6	5.4	10.0	5.2	5.8	5.6	0
Do	60464	♀	14.3	13.8	8.8	5.0	7.6	5.6	10.0	5.2	5.7	5.7	1
Do	60472	♀	13.8	13.4	9.0	4.8	7.2	5.6	10.0	5.2	6.0	5.6	1
Do	35119	♀	14.0	13.2	8.8	4.0	7.2	5.6	10.0	5.0	5.7	5.6	0
Do	60474	♀	14.1	13.4	8.8	4.0	7.4	5.4	10.0	5.2	5.6	5.6	0
Myotis volans interior													
Wyoming: Rattlesnake Mountains	160595	♂	14.2	13.4	8.0	4.0	7.2	5.2	10.0	5.0	5.5	5.6	0
Idaho:													
Inkom	171649	------	14.4	13.8	9.0	4.8	7.4	5.4	10.3	5.2	6.0	5.8	1
Malad	176605	♂	14.4	13.8	8.8	4.6	7.4	5.2	10.2	5.2	5.7	5.6	0
Colorado:													
Coventry	149943	♀	14.8	14.4	9.0	5.0	7.6	5.2	10.4	5.4	5.9	5.8	1
Do	149943	♀	14.8	14.4	9.0	5.0	7.6	5.2	10.4	5.4	5.9	5.8	1
New Mexico:													
Twining	[1] 133426	♂	14.2	14.0	8.8	5.0	7.4	5.4	10.5	5.2	5.5	5.8	2
Do	133428	♂	14.6	14.0	8.8	5.2	7.2	5.2	10.7	5.4	5.6	6.0	1
Do	133427	♀	15.0	14.4	----	5.2	7.2	5.2	10.8	5.6	----	6.0	1
Santa Clara Canyon	147972	♀	14.8	14.2	8.8	5.0	7.2	5.2	10.6	5.2	5.9	5.9	1
Do	147973	♀	14.5	14.0	9.0	4.0	7.4	5.2	10.4	5.2	5.8	5.8	2
Costilla River	133253	♀	14.7	14.0	9.0	5.0	7.4	5.2	10.6	5.2	5.7	5.7	1
Do	133524	♂	14.5	13.8	8.8	4.0	7.6	5.4	10.0	5.2	5.7	5.8	1
Raton Range	128791	♂	14.2	13.4	----	4.0	7.4	5.2	10.0	5.2	5.6	5.8	0
Santa Fe	38596	------	-----	13.8	9.0	4.0	7.4	5.2	10.4	5.4	5.6	5.6	0
Willis	128251	♂	14.8	13.8	9.0	4.0	7.4	5.2	10.8	5.4	6.0	6.0	1
Do	127858	♂	-----	14.0	----	3.8	7.4	5.2	10.6	5.6	6.0	6.0	1
Arizona:													
Chiricahua Mountains	66113	♂	14.5	13.8	8.8	4.0	7.4	5.2	10.2	5.4	5.5	5.8	1
Keam Canyon	67821	♂	14.5	14.0	9.0	4.0	7.4	5.2	10.2	5.4	5.9	6.0	1
Little Spring	202147	♀	-----	13.8	----	4.0	----	5.4	10.0	5.4	5.9	6.0	1
Do	202148	♀	14.8	14.4	8.8	4.0	----	----	10.2	5.6	5.8	5.8	1
Chihuahua: San Luis Mountains	36575	♂	14.3	13.8	8.6	4.0	7.2	5.2	10.2	5.4	----	5.8	1

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[1] Type.

[2] Type of *Myotis capitaneus* Nelson and Goldman.

[3] Type of *Myotis altifrons* Hollister.

Cranial measurements of Myotis volans—Continued

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis volans interior—Continued													
California:													
Fort Tejon	13316 F.M.	♀	14.0	13.4	8.8	4.0	----	5.2	10.0	5.0	5.5	5.4	1
Do	13317	♀	14.6	14.0	----	4.0	7.4	5.4	10.4	5.4	5.8	5.8	1
Do	13318	♀	14.2	14.0	----	4.0	7.2	5.4	10.2	5.4	5.8	5.8	0
Do	13320	♀	14.1	13.4	----	----	7.2	5.2	10.0	5.2	5.8	5.4	0
San Jacinto Mountains	62869 U.S.N.M.	♂	13.9	13.0	8.8	4.0	7.2	5.2	9.8	5.0	5.8	5.4	1
Do	2042 U.C.	♀	13.5	13.0	8.4	4.0	7.2	5.4	9.4	5.0	5.4	5.2	3
Do	2043	♀	13.6	12.8	8.4	4.0	7.2	5.4	9.6	5.0	5.3	5.4	3
San Bernardino Mountains	6663	♀	13.7	13.2	8.8	4.0	7.2	5.6	10.0	5.2	5.6	5.4	2
Myotis volans amotus													
Vera Cruz: Cofre de Perote	[1] 54437	♀	14.0	13.8	8.8	5.0	7.0	5.2	10.3	5.2	5.5	5.7	2
Jalisco:													
Los Masos	27345 A. M. N. H.	♂	----	----	----	3.7	7.5	5.4	10.0	5.4	5.8	5.9	3
Do	27346	♂	13.9	13.4	8.5	4.0	7.0	5.0	10.0	5.5	5.9	5.7	1

[1] Type.

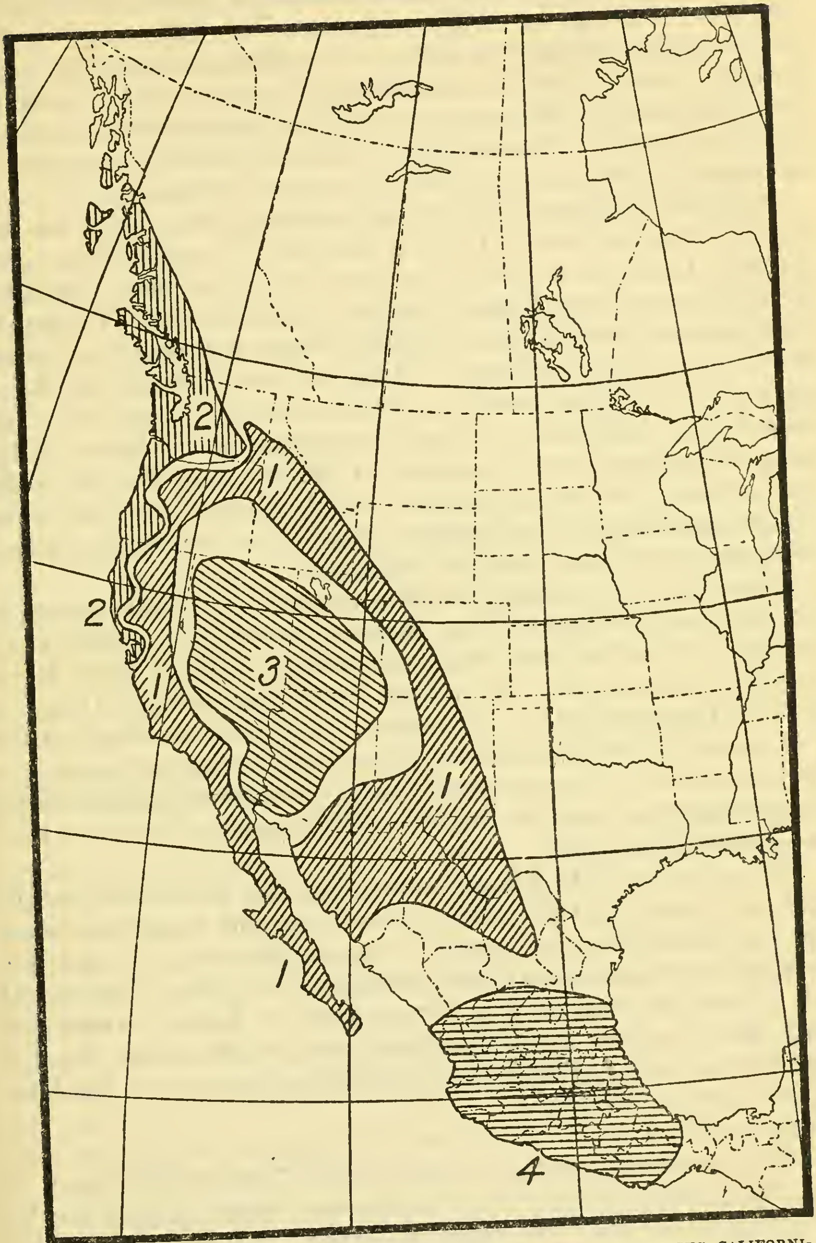
MYOTIS CALIFORNICUS (Audubon and Bachman)

(*Synonymy under subspecies*)

Distribution.—Warmer parts of western North America from the coast of southern Alaska south to the southern part of the Mexican highlands (Oaxaca); eastward it extends across the Great Basin to Utah and central Colorado.

Diagnosis.—Size small; forearm 29 to 36.2 mm.; total length about 85 mm., of which the tail usually forms somewhat less than one-half (ratio of tail to head and body in series of specimens averaging from 91 to 98); greatest length of skull ranging from 12.4 to 14.2 mm.; maxillary tooth row ranging from 4.8 to 5.4 mm.; lower tooth row (excluding incisors) usually less than 5.4 mm. (5.0 to 5.8 mm.). Ear exceeding the muzzle when laid forward. Metacarpals 3 to 5 slightly graduated, the fifth about or quite reaching the elbow when wing is folded. Foot small, slender, relatively shorter than in any other American member of the genus except *Myotis volans* and *M. subulatus*, the ratio of its length to that of tibia usually ranging from about 43 to 46, and occasionally falling as low as 37; calcar distinctly keeled. Pelage full and long but without noticeable gloss, the color of the bases of the hairs strongly contrasting with that of their tips on the dorsal surface.

Ear.—The ear is proportionally large (12 mm. in height) when laid forward exceeding the tip of nose by 1 to 3 mm.; the anterior margin gently convex, the tip slightly narrowed by a shallow notch



MAP 11.—DISTRIBUTION OF MYOTIS CALIFORNICUS: 1, M. CALIFORNICUS CALIFORNICUS; 2, M. CALIFORNICUS CAURINUS; 3, M. CALIFORNICUS PALLIDUS; 4, M. CALIFORNICUS MEXICANUS

on the upper part of the posterior border, below which it is nearly straight to the basal shoulder which stands off gradually instead of projecting abruptly (as in *Myotis yumanensis*). The tragus is narrow, its inner margin straight, and equaling one-half the entire height of the ear (6 mm.); the region of its greatest width is slightly above the level of the inner base, whence the posterior margin is gradually beveled to the acute tip. There is a shallow emargination opposite the inner base, below which is a small rounded lobe.

Wing and membranes.—The wing membrane arises from the side of the foot at the base of the toes, just below the ends of the metatarsals. The third to fifth metacarpals are very slightly graduated or the third and fourth may be almost equal in length. Taking the third finger as 100, the fourth and fifth fingers are respectively about as 86 and 79 (58:50:46 mm.). When the wing is folded the end of the third metacarpal usually comes quite to the elbow (or rarely exceeds it, or falls 0.5 to 1 mm. short); that is, the length of the third metacarpal about equals that of the forearm. The tip of the tail is free. The fur of the body extends slightly on to the membranes, especially on the intertibial part of the uropatagium where there are numerous scattered hairs dorsally.

Foot.—The foot is small, slender, and weak, its length normally less than one-half that of tibia (average ratio of foot to tibia in 10 specimens from the Northwest Coast, 46.6; in 10 from Point Reyes and Nicasio, Calif., 43.1; in 10 from Lower California, 43.4; and in 10 from Patzcuaro, 44.9). The calcar is less than the length of the free border of the uropatagium (about 13:15 mm.) and ends in a projecting lobule. Its edge usually bears a well-developed keel which rises abruptly at about the length of the metatarsus from the heel, and gradually tapers off.

Fur and color.—The pelage is long, full, and of fine texture, the hairs with long silky ends which, however, are dull, rarely burnished. The tips of the hairs are usually brown or yellow in tone, strongly contrasting with their slaty bases both above and below. The dorsal side of the uropatagium is well though thinly haired between the tibiæ above, but not quite to one-half their length below. On the ventral side the fur extends sparingly outward as far as a line joining the knee and the elbow.

Skull.—The skull (pl. 1, p. 7, fig. 14) is delicate and slender, with relatively long and tapering rostrum, about 3/7 of the total length of the skull. The profile of the rostrum rises rather sharply to the forehead and decidedly flat-topped brain case. Sagittal crest usually inconspicuous or absent. Lambdoid ridges distinct though low.

Teeth.—In general the teeth resemble those of *Myotis evotis* reduced in size proportionately to the smaller skull. Upper molars with well-developed hypocone, the base of which is strongly marked off from that of the protocone. Protoconule usually less developed than in *M. lucifugus*, rarely absent; paraloph usually well developed, even when the protoconule is vestigial. Metaloph when present apparently always confined to the bottom of the valley between bases of hypocone and metacone; not infrequently it is absent in one or both teeth. Cingulum clearly marked, but not passing around antero-lingual base of protocone. The small premolars are little crowded; those of the mandible may be spaced, though usually they are in contact.

Remarks.—Myotis californicus does not seem to extend its range beyond the northern border of the United States except for a short distance on the Pacific coast. It is apparently represented in eastern Asia by *Myotis moupinensis* which it closely resembles in size, in the relatively small and delicate feet with distinctly keeled calcar, and in the long silky pelage with contrasted brownish tips and dark bases. The third metacarpal, however, is not quite so long in the Asiatic species. Since the northward ranges of this species and of *Myotis volans* on the west coast of America are nearly coextensive, it may be expected that the ranges of their Asiatic representatives, *M. moupinensis* and *M. frater* respectively, will eventually be found to be so likewise on the other side of the Pacific. Presumably in Tertiary times these areas of distribution were continuous. Some conclusion as to the higher temperature then prevailing to the northward when the two continents were united, might therefore be deduced by a comparison of the temperatures now found at the limits of these species' range on opposite sides of the Pacific.

In its area of dispersal as well as in the number and character of its local forms *Myotis californicus* closely parallels *M. yumanensis.* Each species has a dark race on the humid "northwest coast," a pallid race in the desert interior of the western United States, a form intermediate in color occurring over a wide area where the climatic conditions are neither saturate nor excessively dry, and finally a richly colored form in southern Mexico. Specimens of the two animals are sometimes not very distinctive in color, but the large foot of *Myotis yumanensis* and the very small foot of *M. californicus* are always diagnostic in such instances.

MYOTIS CALIFORNICUS CALIFORNICUS (Audubon and Bachman)

Vespertilio californicus AUDUBON and BACHMAN, Journ. Acad. Nat. Sci. Philadelphia, ser. 1, vol. 8, pt. 2, p. 285, 1842.

Vespertilio nitidus H. ALLEN, Proc. Acad. Nat. Sci. Philadelphia, 1862, p. 247 (Monterey, California); Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 60, fig. 57–59, June, 1864.—DOBSON, Catal. Chiroptera Brit. Mus., p. 318, 1878.—H. ALLEN, Monogr. Bats North Amer., Bull.

U. S. Nat. Mus., No. 43 (1893), p. 94, pl. 12, fig. 1–3, 6–10, March 14, 1894.—TROUESSART, Catal. Mamm. viv. foss., p. 130, 1897.—LYON and OSGOOD, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 272, January 28, 1909.

Vespertilio oregonensis H. ALLEN, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 61, June, 1864 (Fort Yuma, California, and Cape St. Lucas, Lower California).—LYON and OSGOOD, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 272, January 28, 1909.

Vespertilio exilis H. ALLEN, Proc. Acad. Nat. Sci. Philadelphia, p. 283, 1866 (Cape St. Lucas, Lower California); Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 97, footnote, March 14, 1894.

Vespertilio tenuidorsalis H. ALLEN, Proc. Acad. Nat. Sci. Philadelphia, p. 283, 1866 (Cape St. Lucas, Lower California); Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 97, footnote, March 14, 1894.—LYON and OSGOOD, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, pp. 273, 291, January 28, 1909.

Vespertilio yumanensis H. ALLEN, Proc. Acad Nat. Sci. Philadelphia, 1866, p. 283 (not of H. Allen, 1864).

Vespertilio nigricans H. ALLEN, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 97, footnote, March 14, 1894 (not of Maximilian zu Wied, 1826).

Myotis californicus MILLER, North Amer. Fauna, No. 13, p. 69, October 16, 1897.—TROUESSART, Catal. Mamm. viv. foss., p. 1283, 1899.—MERRIAM, North Amer. Fauna, No. 16, p. 89, October 28, 1899.—ELLIOT, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 403, March 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 256, December 27, 1901.—ELLIOT, Field Columb. Mus., publ. 91, zool. ser., vol. 3, p. 319, March, 1904; Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 578, 1904.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 93, 1904.—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 476, 1905.—STEPHENS, California Mammals, p. 266, 1906 (part).—ELLIOT, Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 502, 1907.—J. GRINNELL, Univ. California Publ. Zool., vol. 5, p. 158, October 31, 1908.

Myotis californicus californicus MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 56, December 31, 1912.—J. GRINNELL, Proc. California Acad. Sci., ser. 4, vol. 3, p. 277, August 28, 1913.—GRINNELL and SWARTH, Univ. California Publ. Zool., vol. 10, p. 381, October 31, 1913.—H. W. GRINNELL, Univ. California Publ. Zool., vol. 12, p. 317, December 4, 1914; vol. 17, p. 279, January 31, 1918.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 70, April 29, 1924.—GRINNELL and STORER, Anim. Life in the Yosemite, p. 21, 1924.—STRECKER, Check-List Mamm. Texas, The Baylor Bulletin, Baylor University, Waco, Texas, vol. 29, No. 3, p. 9, August, 1926.

Myotis californicus quercinus H. W. GRINNELL, Univ. California Publ. Zool., vol. 12, p. 317, December 4, 1914 (Seven Oaks, San Bernardino Co., California); vol. 17, p. 285, January 31, 1918.—J. GRINNELL, Univ. California Publ. Zool., vol. 21, p. 314, January 27, 1923.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 71, April 29, 1924.

Type locality.—" California."

Type.—None specified. The original specimen, on which the description was based, was received from "California." It is probably not now in existence. By the recognizing of the dark northwest-coast form *caurinus* and the desert form *pallidus* the name *californicus* in its subspecific sense has become restricted to the wide-ranging race whose color is intermediate between these extremes. This race occurs in the Monterey region which, as already explained, has been selected as the type locality of Harrison Allen's *Vespertilio nitidus.* No "selection" seems possible in the case of *Vespertilio californicus*, because Audubon and Bachman unlike Doctor Allen, mentioned no localities among which to choose; but for the sake of convenience the one region may be treated as though it were the type locality for both names.

Distribution.—From about the latitude of the Tropic of Cancer in continental Mexico, and Cape St. Lucas in Lower California northward along the Pacific coast to the region of San Francisco Bay and in the interior to the northern Sierra Nevada, eastern Oregon and extreme southeastern Washington, eastward to western Texas, central New Mexico and west-central Colorado; replaced by a pallid race in the Great Basin. (See map 11, p. 149.)

In the San Bernardino Mountains of California *Myotis californicus californicus* has been taken at altitudes of nearly 7,500 feet, and in Placer County at 4,000 feet. On the whole it is an inhabitant of the lower altitudes. East of the desert divides of southern California true *californicus* is replaced by the paler race, *pallidus*, and on the coast of northwestern California it merges into the dark *M. c. caurinus.*

Diagnosis.—Color above, tawny with a distinct reddish or chestnut tint; tail very long, the ratio of its length to that of head and body averaging about 95.

Description.—Dorsal surface of head and body "ochraceous-tawny" (Ridgway, 1912), becoming slightly paler on the head; below, similar but paler varying from a pale wash of the dorsal coloration to a "pale buff." The bases of the hairs on both surfaces are "sooty black," except those on the base of the interfemoral membrane above and those at the anal region below; these are without dark bases. Several skins from Monterey, Calif., agree in an unusual richness of color, even the entire belly being a bright "ochraceous tawny" like the back.

As is often the case with reddish species of bats, melanism is not very infrequent. Several skins from Lower California are very dark, nearly "mummy brown" above without reddish shades. Others from Placer County, Calif., are slightly melanistic, a condition which makes them appear almost as dark as *M. californicus caurinus.*

Measurements.—For measurements see tables, pages 161 and 163.

Specimens examined.—Total number 298, from the following localities:

ARIZONA: Camp Grant, 2 alc. (U.S.N.M.); Chiricahua Mountains, 1 skin, 1 alc. (U.S.N.M.); Huachuca Mountains, 1 skin (F. M.), 1 skin (U.C.); Little Meadow, 3 alc. (U.S.N.M.); Nantan Plateau, 25 miles N. E. of Rice, 5,800 feet, 1 skin (U.S.N.M.); Oracle, 5 alc. (U.S.N.M.); Pinal County, 1 skin (A. M. N. H.); Santa Catalina Mountains, 1 skin (U.S.N.M.); S. B. ranch, 1 skin (F. M.).

CALIFORNIA: Calaveras County: San Andreas, 1 skin (U. M.); Eldorado County: Fyffe, 16 skins (U. C.); Fresno County: Dunlop, 1 skin (U. C.); no exact locality, 1 skeleton (U.S.N.M.); Kern County: Fort Tejon, 3 skins, 1 skull (F. M.), 7 alc., 1 skeleton (U.S.N.M.); San Emigdio Creek, 1 skin (U. C.); San Emigdio Canyon, 1 skin (U.S.N.M.); Tejon Pass, 1 alc. (U.S.N.M.); no exact locality, 1 alc. (U.S.N.M.); Los Angeles County: Los Angeles, 1 skin (A. M. N. H.); Pasadena, 1 skin (U. C.); Marin County: Nicasio, 18 alc. (U.S.N.M.); Petaluma, 1 alc. (U.S.N.M.); Point Reyes, 10 alc. (U.S.N.M.); Mariposa County: Dudley, 9 skins (U. C.); Pleasant Valley, 3 skins (U. C.); Varain, 1 skin (U. C.); Yosemite Valley, 1 skin (U. C.); Monterey County: south of Chalk Peak, 3 skins (U. C.); Monterey, 5 skins (U. C.), 1 skin, lectotype of *nitidus* (U.S.N.M.); Paraiso, 1 skin (U.S.N.M.); Soledad, 1 skin (U. C.); Sur River, 1 skin (U.S.N.M.); Placer County: Blue Canyon, 1 skin (U. C.); Dutch Flat, 2 skins (U. C.); Michigan Bluff, 1 skin (U. C.); Riverside County: Banning, 1 alc. (U.S.N.M.); Capistrano, 1 skin (U.S.N.M.); Kenworthy, 1 skin (U. C.); San Bernardino County: Bear Lake, 6,700 feet, 1 skin (U. C.); Fish Creek, 1 skin (U. C.); San Clemente Island, 7 alc. (U.S.N.M.); Santa Ana River, 1 skin (U. C.); Seven Oaks, 2 skins, including type of *quercinus* (U. C.); San Diego County: Cuyamaca Mountains, 1 skin (U. C.); Dulzura, 2 skins (U.S.N.M.), 3 skins (A. M. N. H.), 8 alc. (A. N. S. P.); Julian, 4 skins (U. C.); San Diego, 2 skins, melanistic (U. C.); Santa Ysabel, 4 alc. (U.S.N.M.); Witch Creek, 9 alc. (U.S.N.M.); no exact locality, 2 skins (U.S.N.M.); Santa Clara County: Pacheco Pass, 2 skins (U.S.N.M.); Santa Cruz Island: Friar's Harbor, 3 skins, not typical (U. C.); Shasta County: Fort Crook, 1 alc. (U.S.N.M.); Siskiyou County: Mount Shasta, 1 alc. (U.S.N.M.); Solano County: Vacaville, 3 skins (U. C.); Sonoma County: 7 miles west of Cazadero, 2 skins (U. C.); no exact locality, 1 skin (U. C.); Trinity County: Trinity Mountains, east of Hoopa, 1 skin (U.S.N.M.); Tulare County; East Fork Kaweah River, 4 alc. (U.S.N.M.); Mount Whitney, 4 skins, 1 skull (F. M.); Trout Creek, 6,000 feet, 2 skins (U. C.); Ventura County: Matilija, 1 skin (U. C.); Mount Pinos, 2 skins (U. C.); Santa Barbara, 1 alc. (U.S.N.M.).

CHIHUAHUA: Pacheco, 2 skins (M. C. Z.); San Luis Mountains, 2 skins (U.S.N.M.).

COAHUILA: Guadalupe, 1 skin (U.S.N.M.).

COLORADO: Rifle, Garfield County, 1 skin (U.S.N.M.).

LOWER CALIFORNIA: Cape St. Lucas, 2 alc., types of *exilis* and *tenuidorsalis* H. Allen (A. N. S. P.); Comondu, 2 skins (U.S.N.M.); Matancita, 1 skin (U.S.N.M.); San José del Cabo, 1 skin (U.S.N.M.); San Quintin, 1 skin (U.S.N.M.); Santa Anita, 3 skins, 52 alc. (U.S.N.M.), 4 skins (B. M.).

NEW MEXICO: Animas Valley, 1 skin (U.S.N.M.); Apache, 2 alc. (U.S.N.M.); San Andres Mountains, 5 skins (U.S.N.M.); San Mateo Canyon, 1 skin, 1 alc. (U.S.N.M.).

OREGON: Blue River, 1 skin, 1 alc. (U.S.N.M.); Elgin, 1 alc. (U.S.N.M.); Eugene, 1 skin, approaching *caurinus* (U.S.N.M.); John Day River (near Crown Rock), Wheeler County, 3 alc. (U.S.N.M.); Mount Hood, 2 skins, approaching *caurinus* (U.S.N.M.); Sisters, 3 skins (U.S.N.M.); Wallowa Lake, 1 alc. (U.S.N.M.).

SONORA: Providencia Mines, 1 skin (F.M.); San Luis Mountains, 2 skins (U.S.N.M.).

TEXAS: Fort Davis, 1 alc. (U. C.); Paisano, 1 alc. (U.S.N.M.).

WASHINGTON: Almota, 1 alc. (U.S.N.M.); Anatone, 1 skin (U.S.N.M.); Goldendale, 1 alc. (U.S.N.M.); Lyle, 2 skins (U.S.N.M.); Orondo, 1 alc. (U.S.N.M.).

Remarks.—A series of skins from Lower California, although perhaps on the average a very little paler than the average of those from southern California west of the desert region, can nevertheless be perfectly matched among the latter. The names *exilis* and *tenuidorsalis* applied by Harrison Allen to specimens of this species from Cape St. Lucas are therefore placed in the synonymy of *Myotis californicus californicus*. The types of both of these are in the collection of the Academy of Natural Sciences at Philadelphia. We have not been able to find sufficient ground for recognizing the *Myotis californicus quercinus* described by Mrs. Grinnell.

MYOTIS CALIFORNICUS CAURINUS Miller

Vespertilio nitidus Merriam, Amer. Nat., vol. 29, p. 860, September, 1895.

Myotis californicus caurinus Miller, North Amer. Fauna, No. 13, p. 72, October 16, 1897.—Trouessart, Catal. Mamm. viv. foss., p. 1284, 1899.—Elliot, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 404, March, 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901.—Osgood, North Amer. Fauna, No. 21, p. 37, September 26, 1901.—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 257, December 27, 1901.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 93, 1904.—Stone, Proc. Acad. Nat. Sci. Philadelphia (July, 1904), p. 579, November 17, 1904.—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 477, 1905; Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 503, 1907.—Lyon and Osgood, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 270, January 28, 1909.—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 57, December 31, 1912.—H. W. Grinnell, Univ. California Publ. Zool., vol. 17, p. 432, April 25, 1918.—Miller, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 70, April 29, 1924.

Myotis californicus californicus J. Grinnell, Proc. California Acad. Sci., ser. 4, vol. 3, p. 277, August 28, 1913 (part).—H. W. Grinnell, Univ. California Publ. Zool., vol. 17, p. 279, January 31, 1918 (part).—J. Grinnell, Univ. California Publ. Zool., vol 21, p. 314, January 27, 1923 (part).

Type locality.—Massett, Queen Charlotte Islands, British Columbia, Canada.

Type.—Adult male (in alcohol), No. 72219 United States National Museum (Biological Survey collection), collected at Massett, Graham Island, Queen Charlotte Islands, British Columbia, in 1895, by J. H. Keen.

Distribution.—Humid area of the Pacific coast from the extreme south of the Alaskan archipelago, along the coastal areas of British Columbia, Washington, Oregon, and northwestern California, to the vicinity of San Francisco Bay. (See map 11, p. 149.)

Diagnosis.—Similar to the typical race of *Myotis californicus* but color darker.

Color.—General color above nearly "argus brown" of Ridgway (1912); below, similar but slightly paler, about "Sudan brown." Ears, wings and membranes blackish. Area about the eye, upper lip, and chin covered with shorter stiff dark blackish-brown hairs, but their color not in very noticeable contrast. Basal part of the fur everywhere deep "plumbeous black."

Measurements.—For measurements see tables, pages 161 and 163.

Specimens examined.—Total number 92, from the following localities:

ALASKA: Howkan, Long Island, 2 skins (U. C.).

BRITISH COLUMBIA: Comox, 1 skin (U.S.N.M.); Massett, Queen Charlotte Islands, 18 alc. including type (U.S.N.M.), 2 alc. (B. M.); Port Moody, 1 skin (U.S.N.M.); Skidegate, Queen Charlotte Islands, 3 skins (U.S.N.M.); Sumas, 1 skin (F. M.).

CALIFORNIA: Contra Costa County, Walnut Creek, 3 skins (U. C.); Mendocino County, Cahto, 1 alc. (U.S.N.M.); Lagunitas, 1 skin (U.S.N.M.); Willits, 1 skin (U. C.); Mount Sanhedrin, 5 skins (A. N. S. P.); San Francisco County, 1 skin (U. C.); San Mateo County, Menlo Park, 1 skin (U. C.), 1 alc. (U.S.N.M.); Sonoma County, Guerneville, 2 skins (U. C.).

OREGON: Brownsboro, 1 skin (U.S.N.M.); Corvallis, 1 skin (U. C.); Lookingglass, 1 skin, not typical (U.S.N.M.); Marmot, 1 skin (U.S.N.M.); McKenzie Bridge, 1 skin (U.S.N.M.); Philomath, 2 skins (U.S.N.M.); Prospect, 1 skin, not typical (U. C.); Reston, 1 skin, nearly typical (U.S.N.M.); Tillamook, 1 skin (A. M. N. H.), 2 skins (A. Walker).

WASHINGTON: Ashford, 1 skin (U.S.N.M.); Bartholomew, 7 skins (S. H. Lyman); Blue Creek, Stevens County, 1 alc. (U.S.N.M.); Carson, 2 skins (U.S.N.M.); Castle Rock, 1 skin (U.S.N.M.); Chelan, 1 alc. (U.S.N.M.); Colville, 1 alc. (U.S.N.M.); Fort Steilacoom, 1 skin (B. M.), 2 skins, 1 alc. (U.S.N.M.); Godman Springs, 6 skins (S. H. Lyman); Hompeg Falls, 1 skin (S. H. Lyman); Hoodsport, 2 skins (U.S.N.M.); Lake Cushman (Mason County), 3 alc. (U. M.); Mount Ranier, 1 skin (U.S.N.M.); Prescott, 1 skin (U. C.); Puget Sound, 2 alc. (U.S.N.M.); Tenino, 1 alc. (U.S.N.M.); White Salmon, 1 skin (U.S.N.M.).

Remarks.—The northwest coast race is not very strongly differentiated from true *Myotis californicus*, and many specimens are found that are difficult to refer unhesitatingly to one or the other. In general, however, *M. c. caurinus* is darker, with a smoky-brown appearance due to the more uniformly dark tips to the hairs, whereas in *M. c. californicus* these brown tips distinctly pale out where they meet the plumbeous basal portion, giving a lighter, redder effect to the whole.

MYOTIS CALIFORNICUS PALLIDUS Stephens

Myotis californicus MILLER, North Amer. Fauna, No. 13, p. 69, October 16, 1897 (part).—BAILEY, North Amer. Fauna, No. 25, p. 208, October 24, 1905 (part).—CARY, North Amer. Fauna, No. 33, p. 208, August 17, 1911 (part).—WARREN, Mammals of Colorado, p. 274. 1910 (part).

Myotis californicus pallidus STEPHENS, Proc. Biol. Soc. Washington, vol. 13, p. 153, June 13, 1900.—ELLIOT, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 405, March, 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 256, December 27, 1901.—ELLIOT, Field Columb. Mus., publ. 91, zool. ser., vol. 3, p. 319, March, 1904.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 93, 1904.—ELLIOT, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 579, 1904; Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 477, 1905.—STEPHENS, California Mammals, p. 266, 1906.—ELLIOT, Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 503, 1907.—LYON and OSGOOD, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 291, January 28, 1909.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 57, December 31, 1912.—J. GRINNELL, Proc. California Acad. Sci., ser. 4, vol. 3, p. 277, August 28, 1913; Univ. California Publ. Zool., vol. 12, p. 265, March 20, 1914.—H. W. GRINNELL, Univ. California Publ. Zool., vol. 17, p. 288, January 31, 1918.—J. GRINNELL, Univ. California Publ. Zool., vol. 21, p. 314, January 27, 1923.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 70, April 29, 1924.

Type locality.—Vallecito, San Diego County, Calif.

Type specimen.—Adult male (skin and skull), No. 99829 United States National Museum (Biological Survey collection), collected at Vallecito, San Diego County, Calif., April 1, 1895, by Frank Stephens.

Distribution.—Desert regions of the Great Basin. (See map 11, p. 149.)

Diagnosis.—A pale desert race well characterized by the tricolor pattern of the hairs of the back. These have a dark base, succeeded by a whitish portion, and fulvous tip; tail long.

Color.—General color above (topotypes), very pale, nearly "light ochraceous buff" (Ridgway, 1912). The hairs of the body are "plumbeous black" at the base, with a ring of buffy whitish succeeded by a pale ochraceous tip. The short fur at the back of the ears is whitish to the base, that on the interfemoral membrane pale ochraceous throughout. The short stiff hairs of the lips and about the eyes are slightly darker brownish. Below, the long silky tips of the hairs are everywhere clear dull white to "pale buff"; those at the sides on the membrane are of this tint throughout, elsewhere the bases of the hairs are "plumbeous black." Ears and membranes pale brownish, the interfemoral very pale at the base.

Measurements.—The measurements of the type were: Total length, 80 mm.; tail, 42; tibia, 15; ear, 11; forearm, 30; expanse of wings, 208. A topotype measured by the describer: Total length, 81; tail, 39; ear, 12; expanse, 221; its forearm is 31.5; knee to end of claw, foot extended, 20. For detailed measurements, see tables, pages 161 and 164.

Specimens examined.—Total number 108, from the following localities:

ARIZONA: Beale Spring, 2 alc. (U.S.N.M.); Big Sandy Creek, 1 alc. (U.S.N.M.); Bill Williams River, 5 alc. (U.S.N.M.); Colorado River, Mellen, 2 skins (U. C.); Fort Defiance, 1 alc. (U.S.N.M.); Fort Verde, 1 alc. (A. M. N. H.); Keam Canyon, 1 skin (U.S.N.M.); San Francisco Mountain, 1 skin (U. C.); Santa Catalina Mills, 2 alc. (A. M. N. H.); Tinajas Altas, Yuma County, 3 skins (U.S.N.M.); Yuma, 2 alc. (U.S.N.M.).

CALIFORNIA: Imperial County: Colorado Desert, 1 alc. (U.S.N.M.); Fort Yuma, 1 alc. (U.S.N.M.); Pilot Knob, 3 skins (U.S.N.M.); Inyo County: Amargosa River, 1 alc. (U.S.N.M.); Bennett's Wells, 1 alc. (U.S.N.M.); Death Valley, no exact locality, 10 alc. (U.S.N.M.); Funeral Mountains, 1 alc. (U.S.N.M.); Furnace Creek Ranch, 2 skins (U. C.); Lone Pine Creek, 1 skin (U. C.); Saratoga Springs, 6 alc. (U.S.N.M.); Mesquite Valley, 2 skins (F. M.); Panamint Mountains, 4 skins (F. M.); Panamint Valley, 1 skin (U. C.); San Bernardino County: Lavic, 2 skins (U. C.); opposite Needles, 2 skins (U. C.); San Diego County: No exact locality, 3 alc. (U.S.N.M.); Borego Spring, 1 skin (U.S.N.M.); Colorado Desert, 1 alc. (U.S.N.M.); La Puerta Valley, 4 skins (U. C.); Vallecito, 4 skins (U. C.).

COLORADO: Ashbaugh's Ranch, Montezuma County, 1 skin, 2 alc. (U.S.N.M.).

LOWER CALIFORNIA: San Simon, 2 skins (A. M. N. H.); ?San Pedro Martir Mountains, 20 alc. (A. M. N. H.).

NEVADA: Colorado River, 1 alc. (U.S.N.M.); Cottonwood Range, Humboldt County, 2 alc. (U.S.N.M.); Gold Mountain, 2 alc. (U.S.N.M.); Little High Rock Canyon, Washoe County, 2 skins (U. C.); Pahrump Valley, 1 alc. (U.S.N.M.); Rabbit Hole Mountains, 1 skin (U.S.N.M.); Vegas Valley, 1 alc. (U.S.N.M.).

UTAH: Kanab, 1 skin (U.S.N.M.).

Remarks.—In typical specimens of *Myotis californicus pallidus* the tricolor pattern of the dorsal fur is a striking characteristic due to the extent of the pale ring on the individual hairs, whose ends are reddish as in true *californicus* rather than golden as in *M. c. mexicanus*. Many intermediates occur where the forms meet.

It may be questioned whether the name *Vespertilio oregonensis* H. Allen is not applicable to this race. This name was given in a somewhat ambiguous way to a skin without locality, two skins from Yuma, Arizona, and one from Cape St. Lucas, Lower California. In view of the vague manner in which it was published and the fact that one of the specimens included under it (Cape St. Lucas) is referable to true *Myotis californicus*, we prefer to consider the name a synonym of *californicus* as has already been done by Miller (1897).

MYOTIS CALIFORNICUS MEXICANUS (Saussure)

Vespertilio mexicanus SAUSSURE, Rev. et Mag. de Zool., ser. 2, vol. 12, p. 282, 1860.

Vespertilio nigricans ALSTON, Biol. Centr.-Amer., Mammalia, p. 206, 1881 (not of Wied).

Vespertilio agilis H. ALLEN, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 282 (Mirador, Vera Cruz, Mexico).—LYON and OSGOOD, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 290, January 28, 1909.

Vespertilio nitidus J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 3, p. 177, December 10, 1890.

Myotis californicus mexicanus MILLER, North Amer. Fauna, No. 13, p. 73, October 16, 1897.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 257, December 27, 1901.—ELLIOT, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 579, 1904.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 93, 1904.—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 477, 1905.—J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 22, p. 260, July 25, 1906.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 57, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 71, April 29, 1924.

Myotis nigricans J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 22, p. 260, July 25, 1906 (not of Wied; specimens from Jalisco).—NELSON, North Amer. Fauna, No. 14, p. 18, April 29, 1899 (not of Wied; specimen from Tres Marias Islands).

Type locality.—Exact locality unknown, but the type specimen was collected somewhere in the warmer part of the State of Mexico. Saussure says of the animal: "Habite les parties chaudes du Mexique. J'ai pris ce Vespertilion dans les terres chaudes de la province de Mexico."

Type specimen.—The description was based on an alcoholic specimen collected by H. de Saussure. If still in existence it is probably in the Museum of Natural History at Geneva, Switzerland, where most of Saussure's Mexican material is preserved.

Distribution.—Southern Mexico, from Oaxaca north to about the Tropic of Cancer. (See map 11, p. 149.)

Diagnosis.—Slightly larger than typical *Myotis californicus;* general color tending toward a dull orange brown rather than chestnut; tail less elongated than in the other races, its ratio to head and body averaging about 90.

Color.—There is a tendency to dichromatism in this race. In the darker phase the general color is dull brown, of much the same shade as in *Myotis lucifugus*, nearly "Brussels brown" (Ridgway, 1912), slightly darker on the head; below, the chin, throat, and chest are similar but paler, becoming dull whitish at the anal region. The hair about the eyes and upper lips is blackish brown; ears and membranes the same. Bases of the hairs above and below "plumbeous black." In the lighter phase, the upper surface is a lively "Sudan brown," paling to dull "ochraceous buff" below. Two immature specimens from Patzcuaro are very much darker than the adults, sooty above with the tips of the longer hairs on the back reddish; lighter below, clouded with brownish. In this pelage they are very similar to adults of the northern form of *Myotis nigricans*, but are distinguishable by the more conspicuous dark underfur on back, smaller foot, and large teeth.

Skull.—In general form, the skull is quite like that of true *Myotis californicus*, with delicate rostrum, brain case high, oval, tapering at the front end and not flat topped like that of *M. subulatus* and its races. In the Patzcuaro series, it is very distinctly larger than in true *californicus*, or indeed than in the specimens from Oaxaca.

Measurements.—For measurements see tables, pages 162 and 164.

Specimens examined.—Total number 78, from the following localities:

GUANAJUATO: Guanajuato, 1 alc. (A. N. S. P.).
JALISCO: Los Masos, 6 skins (A. M. N. H.); Santa Rosalia, 1 alc. (B. M.); Sierra Nevada de Colima, 9 skins (A. M. N. H.).
MICHOACAN: Patzcuaro, 8 skins, 41 alc. (U.S.N.M.).
OAXACA: Reyes, 5 skins (U.S.N.M.); Cuicatlan, 1 alc. (U.S.N.M.).
SAN LUIS POTOSI: La Parada (Hda.), 1 alc. (U.S.N.M.).
TAMAULIPAS: Miquihuana, 2 alc. (U.S.N.M.).
TRES MARIAS ISLANDS: 1 alc. (B. M.).
VERA CRUZ: Mirador, 1 alc., type of *agilis* (A. N. S. P.).
ZACATECAS: San Juan Capistrano (Hda.), 1 alc. (U.S.N.M.).

Remarks.—Saussure's description of a small *Myotis* occurring in the hot part of the Province of Mexico, and having a forearm of 33 mm. in length, is taken to refer to the representative of *Myotis californicus* here described. The color of the type, after immersion in alcohol, was said to be golden brown, grayish below. This excludes the possibility that Saussure had in hand a form of *M. nigricans.*

The series from Patzcuaro, Michoacan, seems typically large and dark. Of similar large size is the type specimen of *Vespertilio agilis* H. Allen, from Mirador, Vera Cruz; hence this name is undoubtedly a synonym of *mexicanus*. A series of skins from Reyes, Oaxaca, is slightly but distinctly smaller, and the skulls average a little less in size.

External measurements of Myotis californicus

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis californicus californicus													
Washington:													
Almota	77430	♀	39.6	35.0	13.0	6.4	31.4	5.6	30.0	27.0	11.6	9.2	8.8
Orondo	91814	♀	35.0	32.0	13.4	6.4	29.0	4.4	-----	-----	12.0	9.4	8.4
Oregon: Elgin	78596	♀	39.6	35.6	14.0	5.0	33.4	5.0	32.8	31.4	12.2	10.4	8.4
California:													
Fort Tejon	6065	♀	35.2	36.2	12.4	7.2	32.0	4.8	30.0	29.0	13.2	11.0	7.6
Do	6066	♂	39.0	34.6	13.4	6.0	31.4	4.0	29.8	28.4	13.0	10.8	9.0
Do	6052	♀	38.0	36.6	12.6	6.6	31.0	4.4	30.0	28.4	13.4	12.0	8.8
Do	6063	♀	41.0	37.0	14.0	6.0	32.6	4.8	31.0	29.0	12.0	10.6	8.0
Nicasio	60460	♂	40.8	31.6	13.4	6.0	31.4	4.4	30.0	29.0	12.0	9.0	9.0
Do	60463	♀	40.4	37.4	14.0	6.4	32.4	4.4	30.8	29.8	13.8	10.8	10.0
Do	59496	♀	41.8	37.8	14.0	6.0	33.4	5.0	31.6	30.4	13.0	9.4	9.4
Do	59497	♂	38.8	38.2	13.0	5.6	31.2	5.0	29.0	27.6	12.8	9.8	8.8
Do	59498	♀	43.6	38.2	13.8	6.0	33.0	4.4	31.2	30.0	13.2	10.2	9.0
Do	59499	♀	41.6	36.6	13.8	6.2	33.2	4.6	30.6	29.2	13.4	10.0	10.0
Point Reyes	22284	♀	38.8	40.4	13.2	6.0	32.2	4.4	32.0	30.2	12.6	10.0	7.8
Do	22285	♀	43.0	37.0	13.2	6.0	32.2	4.2	31.0	29.2	13.4	11.4	8.2
Do	22286	♀	41.0	38.8	14.4	5.2	34.0	4.4	32.4	30.8	12.8	11.6	8.2
Do	22287	♀	41.8	37.0	13.2	6.0	31.4	4.2	29.6	28.6	13.0	10.4	9.0
Do	60487	♀	38.0	36.0	13.8	6.2	33.0	4.8	31.8	29.2	13.0	11.0	8.0
Do	60500	♀	39.2	35.4	13.4	5.4	32.4	4.4	30.0	29.0	12.6	9.8	8.8
Arizona:													
Oracle	18776	♀	44.0	38.4	14.4	7.0	33.0	4.2	30.8	30.0	12.8	11.0	8.8
Do	18777	♀	39.0	38.6	13.2	5.6	31.6	4.2	30.0	29.2	13.0	10.8	8.8
Do	18778	♀	39.6	36.6	14.4	7.0	33.6	5.0	31.4	30.2	14.6	13.0	8.0
Do	18780	♀	42.0	40.0	13.6	6.6	33.0	5.2	30.6	30.0	12.2	11.2	8.8
Do	18779	♀	41.0	40.0	14.4	6.4	31.0	4.8	29.4	28.8	13.8	11.8	8.8
Little Meadow	131980	♀	36.6	38.2	14.4	5.6	31.6	4.0	31.6	29.4	13.0	10.0	7.2
Do	131981	♀	39.6	39.6	15.0	5.4	31.4	4.2	31.8	31.6	12.4	10.8	8.0
Lower California:													
Santa Anita	96497	♀	38.4	35.4	12.0	5.2	29.6	4.0	29.0	28.6	13.0	10.2	7.8
Do	96500	♀	41.0	38.8	15.0	6.2	32.4	5.0	31.2	30.6	13.0	11.4	8.0
Do	148355	♂	41.6	34.8	14.4	6.0	30.6	4.4	31.0	30.0	13.0	10.0	9.0
Do	148357	♀	39.0	38.0	14.8	6.0	33.2	5.0	31.8	31.8	12.8	10.0	9.4
Do	148366	♂	37.6	34.0	14.0	5.8	31.8	4.0	32.0	31.0	12.4	10.8	8.0
Do	148367	♂	38.8	35.4	12.2	6.0	30.2	4.4	29.2	28.6	12.2	9.8	8.0
Do	148375	♀	37.4	36.8	13.0	6.4	31.8	5.0	30.4	29.2	13.8	11.6	8.4
Do	148376	♂	36.0	36.8	13.8	5.4	31.6	4.8	30.6	29.8	13.4	12.0	9.2
Do	148382	♂	40.6	36.0	12.6	5.4	30.2	4.0	30.0	29.6	14.0	11.2	8.0
Do	148386	♀	40.0	37.0	13.6	6.0	31.6	4.2	31.0	30.8	12.0	9.8	8.8
Do	148395	♂	38.4	36.8	13.0	6.0	30.8	4.6	31.0	29.6	12.0	10.2	8.6
Myotis californicus caurinus													
Queen Charlotte Islands	35602	♀	38.2	33.6	13.4	6.4	31.4	4.2	31.0	29.6	11.2	10.0	7.2
Do	72217	♀	41.6	36.0	13.6	6.0	32.0	5.0	30.0	29.0	13.0	10.0	8.0
Massett	94293	♀	42.4	37.4	14.2	6.2	32.6	4.4	31.0	29.8	12.8	11.0	9.2
Do	94295	♀	43.0	37.2	14.2	6.2	32.8	4.6	30.8	29.2	13.0	11.4	8.4
Do	94296	♂	43.4	37.0	14.0	6.4	33.8	4.6	30.0	29.6	13.2	11.2	9.0
Do	94297	♀	41.0	35.0	14.2	6.0	33.0	5.0	31.0	29.2	13.2	11.0	8.4
Do	94298	♂	41.8	36.0	13.6	7.0	33.6	5.0	31.4	30.2	13.0	11.6	8.8
Do	[1] 72219	♂	37.8	33.0	13.0	6.4	32.2	5.4	30.6	29.0	11.8	9.6	7.2
Do	91.7.1.1. B.M.	♂	43.4	34.6	14.4	6.4	33.4	4.8	32.2	31.2	11.8	11.4	9.0
Do	91.7.1.2	♂	42.2	36.2	13.6	7.0	32.0	4.6	29.6	28.4	13.6	12.0	8.4
Washington:													
Fort Steilacoom	5365	♂	42.0	39.8	13.4	6.0	33.0	4.8	31.6	30.0	13.8	11.2	9.4
Puget Sound	6048	♀	43.0	31.4	12.8	6.0	32.0	5.0	30.0	28.4	11.2	11.2	8.2
Blue Creek	24011	♀	40.0	36.6	14.0	7.0	33.2	5.0	32.4	31.4	13.6	11.8	8.0
Tenino	33025	♂	36.6	35.4	13.4	5.4	31.4	4.4	29.4	28.8	12.2	10.4	8.0
Myotis californicus pallidus													
Nevada:													
Colorado River	27056	♂	34.4	39.0	13.2	7.0	30.4	4.4	29.4	28.6	12.4	11.2	8.0
Gold Mountain	28969	♂	39.0	39.0	15.2	6.2	31.6	4.2	31.4	29.4	13.0	11.4	9.6
Do	28970	♂	33.0	38.6	15.0	5.2	31.8	4.0	31.2	30.0	13.8	11.0	9.0
Pahrump Valley	27055	♀	38.0	41.6	14.2	6.0	33.4	4.8	32.0	31.0	12.2	11.6	8.2
Vegas Valley	27054	♀	40.0	37.8	14.2	6.0	32.2	4.4	32.0	30.0	12.8	11.0	8.6
Colorado:													
Ashbaugh's Ranch	151154	♀	37.0	37.8	13.8	6.0	32.0	4.4	31.2	30.4	12.6	11.8	8.8
Do	151155	♀	39.6	39.8	15.0	5.8	33.4	4.6	31.8	31.6	13.0	11.4	8.4

[1] Type.

External measurements of Myotis californicus—Continued

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis californicus pallidus—Continued													
Arizona:													
Beale Spring	125797	♂	38.0	37.4	14.4	6.0	31.2	4.2	31.4	30.0	12.4	10.0	8.0
Do	125798	♂	37.6	37.0	14.2	6.6	33.2	4.0	30.0	30.0	13.2	11.4	8.6
Big Sandy Creek	131940	♂	39.4	38.4	14.0	5.2	30.0	4.0	29.6	28.0	11.6	10.8	8.2
Bill Williams River	131941	♂	38.8	35.6	14.0	5.4	31.0	4.0	29.8	28.4	12.0	11.0	8.4
Do	131942	♂	37.2	37.6	13.4	5.8	30.6	4.0	29.6	28.2	12.0	11.0	8.0
Do	131943	♀	37.4	34.6	13.6	6.0	30.6	4.0	31.2	29.4	13.0	12.0	7.8
Do	131944	♀	37.8	37.0	14.4	5.8	31.4	4.0	30.0	28.6	12.8	11.0	7.6
California:													
Death Valley	27058	♂	38.8	39.0	14.2	6.0	32.0	4.4	31.6	31.0	12.2	11.4	8.4
Do	27059	♂	37.2	40.0	15.4	6.0	32.2	4.2	31.4	30.4	12.4	11.8	8.8
Do	27061	♂	38.4	38.0	14.0	6.0	31.0	4.2	30.0	29.0	13.0	10.0	8.8
Do	77407	♂	39.0	38.8	14.0	6.4	31.2	4.0	30.0	29.2	12.6	11.0	9.0
Do	77409	♂	37.6	40.8	14.4	5.6	30.6	4.2	30.0	29.0	13.0	11.4	8.4
Do	77410	♂	35.0	39.0	14.8	5.8	32.6	4.0	29.8	29.4	12.0	11.2	9.2
Saratoga Springs	77438	♂	39.0	39.0	13.6	5.4	32.0	5.0	30.2	30.0	13.0	11.8	8.8
Do	77439	♂	39.6	37.8	14.2	6.2	33.0	4.2	32.0	30.0	13.4	11.0	8.2
Do	77444	♂	39.6	38.4	14.6	5.6	31.4	4.2	30.4	31.0	12.8	11.0	8.4
Myotis californicus mexicanus													
Michoacan:													
Patzcuaro	52145	♀	43.6	38.6	13.2	6.6	34.6	4.4	32.2	31.2	13.0	11.8	9.2
Do	52146	♂	43.0	39.4	14.2	6.2	35.4	4.2	34.0	32.6	13.0	12.0	8.0
Do	52149	♀	42.2	39.4	14.8	6.2	35.6	5.0	34.6	32.2	12.0	11.0	8.6
Do	52150	♀	42.4	34.0	13.0	6.4	33.2	4.6	31.2	31.0	13.0	11.6	8.0
Do	52152	♀	41.2	36.2	13.2	5.6	34.0	5.0	33.0	31.0	14.6	11.0	8.4
Do	52153	♂	42.2	36.2	13.0	6.0	33.2	4.8	32.0	30.8	13.8	12.2	8.0
Do	52154	♂	43.6	34.0	14.2	6.6	34.8	5.0	33.4	31.4	13.0	11.2	8.0
Do	52155	♂	41.0	40.0	14.0	6.0	32.6	4.2	31.2	31.0	12.2	11.0	8.6
Do	52157	♀	43.0	39.2	14.4	6.2	34.8	4.6	34.0	32.8	13.8	11.2	8.4
Do	52158	♀	42.0	37.4	14.2	6.2	35.4	4.2	34.0	33.2	14.0	12.0	8.6
Do	52160	♀	40.6	38.0	14.2	6.6	34.2	5.0	34.0	32.6	13.2	11.6	9.0
Do	52161	♀	44.0	38.8	15.0	6.0	36.0	5.0	34.6	32.6	12.0	10.2	8.4
Do	52208	♀	42.0	38.2	15.0	6.4	36.2	4.2	35.2	34.0	14.0	11.8	9.2
Do	52211	♂	40.2	35.4	13.6	6.0	33.8	4.6	33.0	32.0	12.0	11.0	8.6
Do	52212	♀	39.6	36.0	13.0	6.8	33.6	4.6	32.0	31.0	13.4	11.0	8.8
Do	52275	♀	41.0	37.0	14.4	6.2	35.6	4.6	35.0	33.2	13.6	12.0	8.2
Do	52278	♂	41.0	37.0	14.6	6.2	34.0	5.0	33.6	32.0	13.0	10.0	8.4
Do	52279	♀	41.0	35.0	13.8	6.0	34.4	5.0	33.0	31.6	13.0	11.0	8.0
Do	52281	♂	40.6	34.8	13.0	5.8	33.6	4.6	31.0	30.8	13.4	11.2	8.6
Do	52283	♀	44.8	38.0	14.0	6.6	35.8	5.0	33.8	32.8	14.0	11.0	9.0
Do	52285	♀	41.0	38.0	14.2	6.2	34.6	4.8	33.6	33.0	12.4	11.0	7.8
Do	52296	♀	44.8	37.0	14.4	7.0	34.8	4.6	32.0	33.0	12.4	12.2	8.4
Do	52298	♀	44.0	41.8	14.6	6.0	36.2	4.4	34.8	32.4	13.0	11.0	8.0
Tamaulipas:													
Miquihuana	96555	♂	39.6	40.0	15.0	6.0	33.2	4.6	31.2	29.6	13.2	10.8	8.0
Do	96556	♂	40.4	39.2	15.6	6.0	34.0	5.0	33.0	32.4	13.4	12.0	8.8
Zacatecas: Hda. San Juan Capistrano	92380	♀	42.2	34.8	14.4	5.4	34.6	4.4	33.2	30.4	13.2	11.2	8.0
San Luis Potosi: Hda. La Parada	52311	♂	42.0	40.8	14.2	6.4	34.0	5.0	32.0	30.4	14.0	13.2	9.0
Oaxaca: Culcatlan	70710	♂	37.0	38.4	14.2	6.2	33.4	5.0	31.0	30.0	13.0	11.0	8.4

Cranial measurements of Myotis californicus

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis californicus californicus													
California:													
Nicasio	59497 U.S.N.M.	♂	12.8	12.0	----	3.2	6.6	4.2	9.0	4.8	4.9	5.0	0
Do	59496	♀	13.0	12.8	----	3.2	6.4	4.2	9.2	5.0	5.0	5.2	1
Do	59498	♀	-----	12.8	7.8	3.2	6.6	4.2	9.4	5.2	5.1	5.4	2
Do	59499	♀	13.6	13.0	8.2	3.2	6.8	4.6	9.4	5.0	5.0	5.2	2
Do	60463	♀	13.2	12.2	----	3.4	6.6	4.6	9.0	5.0	5.1	5.2	0
San Clemente Is	61683	♂	12.7	12.4	----	3.0	6.2	4.8	----	5.0	5.0	5.2	0
Do	61682	♀	12.8	12.2	----	3.0	6.4	4.6	9.0	5.0	5.0	5.2	1
Capistrano	149903	♂	12.6	12.2	8.0	3.0	6.6	4.2	9.0	4.8	5.0	5.0	0
San Emigdio Canyon	128861	♀	12.8	12.6	8.0	3.0	6.4	4.6	9.2	4.8	5.0	5.0	3
San Bernardino Mountains	150447	♀	13.0	12.4	8.0	3.0	6.8	4.4	9.2	5.0	5.3	5.2	1
Pacheco Pass	150649	♀	13.0	12.6	8.0	3.0	6.4	4.4	9.0	5.0	5.3	5.2	1
Do	150578	♂	-----	13.2	9.0	3.0	6.8	4.2	10.0	5.4	----	5.8	2
Mount Whitney	13300 F.M.	♀	13.3	12.6	----	3.2	6.4	4.2	----	5.0	5.0	----	3
Do	13303	♀	13.3	12.4	----	3.2	6.4	4.2	9.2	5.0	5.1	5.2	1
Do	13304	♀	13.0	12.2	8.0	3.0	6.4	4.4	9.2	5.0	4.8	5.2	3
Fort Tejon	13302	♂	13.1	12.4	----	3.0	6.2	4.4	9.0	5.0	4.8	5.2	2
Do	13306	♂	13.1	12.4	8.0	3.0	6.2	4.2	9.2	5.0	5.0	5.0	2
Do	13307	♀	13.6	12.4	----	3.2	6.4	4.2	9.2	5.0	5.0	5.2	1
Do	38669 U.S.N.M.	♂	12.6	11.8	7.5	3.4	6.4	4.4	8.8	5.0	4.7	5.2	0
Lower California:													
Santa Anita	98. 3. 1. 25 B.M.	♂	13.6	12.8	----	3.0	6.2	4.6	9.0	5.0	5.1	5.4	1
Do	26	♀	13.6	12.6	----	3.0	6.0	4.8	9.4	5.0	5.4	5.2	2
Do	60	♀	13.5	12.8	----	3.0	6.0	4.4	9.8	5.0	5.0	5.4	3
Do	61	♀	13.4	12.6	7.8	3.0	6.0	4.6	9.2	5.0	5.2	5.2	1
Do	93556 U.S.N.M.	♂	13.1	12.4	----	2.8	6.2	4.6	----	5.0	5.0	----	0
Do	146945	♂	13.6	12.6	8.0	3.0	6.2	4.4	9.2	5.0	5.0	5.2	1
Do	148344	♂	13.0	12.2	----	3.0	6.0	4.6	9.2	5.0	5.0	5.2	1
Do	148355	♂	13.2	12.0	----	3.0	6.2	4.8	9.0	4.8	5.0	5.2	0
Do	146946	♀	13.1	12.0	----	2.8	6.0	4.2	9.0	5.0	5.0	5.2	0
Do	148345	♀	13.6	12.4	8.0	3.0	6.2	4.6	9.2	5.0	5.2	5.2	0
Do	148346	♀	13.8	12.8	8.0	3.0	6.2	4.6	9.4	5.0	5.0	5.4	0
Do	148349	♀	-----	12.4	8.0	2.8	6.0	4.4	9.2	5.0	5.0	5.2	0
Do	148350	♀	13.0	12.2	7.6	3.0	6.2	4.6	9.0	5.0	5.2	5.2	0
Do	148351	♀	-----	12.2	----	3.0	6.2	4.4	9.2	5.0	5.2	5.4	0
Do	148352	♀	14.0	13.0	----	3.0	6.4	4.6	9.6	5.0	5.2	5.4	0
Do	148353	♀	13.5	12.2	7.6	3.0	6.2	4.8	9.2	5.0	5.0	5.4	0
Do	148354	♀	13.2	12.8	8.0	3.0	6.4	5.0	9.4	5.2	5.1	5.6	0
Do	148357	♀	13.2	12.4	8.0	3.0	6.2	4.8	9.2	5.0	5.1	5.4	0
Comondu	146045	♂	13.3	12.0	8.0	2.8	6.2	4.8	9.0	5.0	5.0	5.2	0
Do	146047	♀	13.4	12.6	8.0	2.6	6.2	4.6	9.2	5.0	5.0	5.2	1
San Quintin	138945	♀	13.5	12.4	----	3.0	6.2	4.8	9.0	5.0	5.1	5.4	0
Matancita	146120	♂	14.0	13.0	----	3.0	6.2	4.8	9.4	5.0	5.3	5.4	0
San José del Cabo	146695	♀	13.1	12.0	7.6	3.0	6.0	4.4	9.0	5.0	5.0	5.2	1
Chihuahua:													
San Luis Mountains	36573	♀	13.2	12.4	8.0	3.0	6.0	5.0	9.2	5.0	5.4	5.4	3
Do	36576	♀	14.0	12.8	----	3.0	6.2	4.6	10.0	5.2	5.4	5.6	2
Myotis californicus caurinus													
British Columbia:													
Massett	[1] 72219	♂	12.8	12.0	----	3.2	7.0	4.4	9.0	4.8	5.0	5.0	0
Do	100682	♂	13.0	12.2	8.0	3.2	7.0	4.6	9.0	5.0	5.3	5.0	0
Do	100681	♀	13.2	12.8	8.0	3.2	6.8	4.2	9.4	5.0	5.3	5.2	0
Comox	146765	♂	12.8	12.4	----	3.2	6.4	4.6	8.8	4.8	5.0	5.0	0
Port Moody	66934	♂	13.0	12.2	7.8	3.2	7.0	4.6	9.0	5.0	5.0	5.2	0
Sumas	7214 F.M.	♂	13.3	12.6	----	3.2	6.6	4.4	9.2	5.0	4.9	5.2	0
Washington:													
Chelan	30314	♂	13.2	12.4	----	3.0	6.4	4.2	9.2	5.0	5.1	5.2	0
Mount Rainier	89589	♀	14.0	13.0	----	3.2	6.8	4.4	9.8	5.0	5.2	5.2	1
Fort Steilacoom	1658	----	12.6	12.0	----	3.0	6.4	4.2	9.0	5.0	4.9	5.0	0
Do	38022	♂	-----	12.2	----	3.2	6.4	4.4	9.0	5.0	----	5.2	0
East of Colville	38032	----	13.0	12.2	7.6	3.0	6.4	4.2	9.2	5.0	5.0	5.2	0
Oregon:													
McKenzie Bridge	204387	♀	13.2	13.0	8.0	3.2	6.6	4.4	9.4	5.0	5.1	5.2	0
Marmot P. O	80218	♀	13.2	13.0	7.6	3.2	6.6	4.4	9.4	5.0	5.0	5.4	0

[1] Type.

Cranial measurements of Myotis californicus—Continued

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis californicus pallidus													
Nevada: Rabbit Hole Mountains	94381	♂	13.2	12.2	8.0	3.0	6.0	4.2	9.2	4.8	5.0	5.2	0
Utah: Kanab	161291	♂	13.0	12.4	7.8	2.8	6.2	4.2	9.0	5.0	4.8	5.2	0
Colorado: Ashbaugh's Ranch	149201	♀	13.2	12.6	----	3.0	6.2	4.4	9.2	5.0	----	5.2	2
Arizona:													
Keam Canyon	67822 U.S.N.M.	♀	12.6	12.4	8.0	3.0	6.0	4.2	9.0	5.0	5.1	5.2	0
Tinajas Altas	141840	♀	13.6	12.6	----	3.2	6.4	4.2	9.0	5.0	5.0	5.2	1
California:													
Borego Spring	83475	♀	13.0	12.2	7.8	2.8	6.0	4.2	9.0	5.0	4.8	5.0	1
Fort Yuma	6072	♀	12.9	12.2	7.4	3.0	6.0	4.2	9.6	4.8	5.0	5.0	1
Furnace Creek	27060	♂	13.0	12.2	8.0	3.0	6.0	4.4	9.0	5.0	5.1	5.0	1
Mesquite Valley	13312 F.M.	♂	13.3	12.4	7.8	3.0	6.2	4.4	9.2	5.0	5.0	5.2	3
Do	13313	♀	13.5	12.6	7.8	2.8	5.8	4.6	9.0	5.0	5.1	5.4	2
Panamint Mountains	13309	♂	13.3	12.2	----	3.0	6.2	4.4	9.2	5.0	----	5.2	1
Do	13311	♂	13.6	12.2	----	2.8	6.2	4.2	9.2	5.0	5.0	5.2	0
Do	13308	♀	13.1	12.2	----	3.0	6.2	4.6	9.0	5.0	----	5.2	1
Do	13310	♀	13.1	12.2	7.6	3.0	6.2	4.2	9.0	5.0	5.0	5.2	1
Pilot Knob, San Diego County	126040 U.S.N.M.	♂	13.1	12.2	8.0	2.8	6.4	4.4	9.0	5.0	5.0	5.0	1
Do	126042	♂	13.0	12.6	7.8	2.8	6.2	4.2	9.0	5.0	5.0	5.2	0
Do	126041	♀	13.0	12.8	8.0	2.8	6.0	4.2	9.0	5.0	5.1	5.2	1
Myotis californicus mexicanus													
Michoacan:													
Patzcuaro	50791	♂	14.0	13.2	----	3.0	6.2	5.0	10.0	5.4	5.4	5.8	0
Do	50792	♂	14.2	13.4	8.6	3.0	6.2	5.0	10.0	5.4	5.5	5.8	0
Do	50793	♀	13.6	13.0	8.2	3.4	6.4	4.8	9.8	5.2	5.4	5.8	1
Do	50794	♀	13.6	13.0	----	3.2	6.4	4.8	9.8	5.2	5.4	5.8	0
Do	50795	♀	14.0	13.0	7.8	3.0	6.2	4.8	10.0	5.2	5.5	5.8	0
Do	50796	♀	13.4	13.0	8.0	3.0	6.4	4.6	9.8	5.2	5.5	5.4	1
Do	50798	♀	13.4	12.8	7.7	3.2	6.5	4.5	9.8	5.0	5.4	5.5	0
Oaxaca:													
Reyes	69716	♂	13.2	12.2	7.8	3.2	6.4	4.2	9.0	5.0	5.0	5.2	0
Do	69717	♂	13.3	12.2	8.0	3.0	6.4	4.4	9.2	5.0	5.0	5.2	1
Do	69713	♀	13.1	12.2	7.8	3.0	6.2	4.2	9.0	5.0	5.2	5.2	2
Do	69714	♀	----	----	----	3.2	----	----	9.8	5.2	5.1	5.4	1
Do	69718	♀	13.0	----	----	3.0	----	----	9.6	5.0	5.0	5.2	1

MYOTIS SUBULATUS (Say)

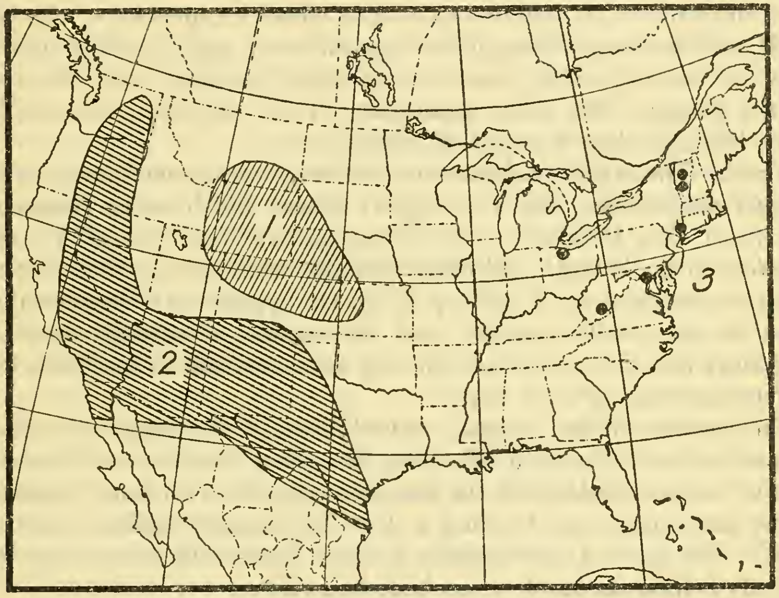
(Synonymy under subspecies)

Distribution.—North America from central New England westward to eastern Oregon and Washington, and thence south to Lower California, Arizona, and northern Sonora. The limits of the range can not as yet be exactly defined.

Diagnosis.—In size and general proportions about as in *Myotis californicus* (average ratio of tail to head and body in 16 specimens, 94.3; average ratio of foot to tibia in 16 specimens, 43.4), but thumb longer, the wrist and thumb together usually 8 to 8.5 mm. instead of 6 to 7.5 mm., teeth larger, and skull with noticeably flattened brain case; fur of back often with a decided gloss.

Ear.—The ear is similar in shape to that of *Myotis californicus* but slightly larger. Laid forward it reaches the tip of the snout or exceeds it by about 1 mm. Tragus slender, tapering, half the height of the ear with a small rounded lobe at the base cut off by a shallow notch. Both its margins are without crenulations.

Wing and membranes.—The wing membrane arises from the side of the foot at the ends of the metatarsals. Metacarpals subequal, the third usually but very little longer than the fourth and fifth, which are about equal in length though sometimes slightly graduated. In one or two cases the fifth just exceeds the fourth, in another the third and fifth are equal, exceeding the fourth, while in two other specimens the third and fourth are equal, the fifth a trifle shorter, and in another all three are of equal length. In a wing showing slight gradation of these bones, the fourth and fifth fingers are to the third as 84 and 79 to 100; in a second individual having the third and fifth metacarpals equal, the fourth and fifth finger are practically equal, and stand in the ratio of 84 and 83 respectively to the third. When the wing is folded, the third metacarpal usually falls short of the elbow by 1 mm. or a little more, and individuals in which this metacarpal equals the forearm are less frequently met with than in *Myotis californicus*. The extreme tip of the tail is free. The fur of the body extends, as in *M. californicus*, slightly upon the membranes, reaching the level of the distal fourth of the interfemoral above. Below, it extends to a line joining the middle of the humerus and the knee, and from knee to knee on the lower side of the interfemoral membrane.



MAP 12.—DISTRIBUTION OF MYOTIS SUBULATUS; 1, M. SUBULATUS SUBULATUS; 2, M. SUBULATUS MELANORHINUS; 3, M. SUBULATUS LEIBII

Foot.—The foot is small and delicate, essentially like that of *Myotis californicus*. Its length is usually less than one-half that of the tibia (ratio in 16 specimens, 43.4). The calcar is long and slender, equalling or exceeding the free border of the interfemoral, and ends in a small projecting lobule. Its edge has a prominent keel, that rises with gentle slope at about the length of the metatarsus from the foot. The length of the leg and foot from knee to end of extended claws is usually about 21 to 23.5 mm.

Fur and color.—The pelage is even more full and silky than in *Myotis californicus*, the tips of the long hairs toning on flaxen or yellow rather than on the dull chestnut of the latter. The most striking differences between the two are: (1) the frequently burnished tips of the hairs in *Myotis subulatus* as contrasted with the usually dull lusterless pelage of *M. californicus*, and (2) the black face and ears of *M. subulatus* giving a masked appearance, whereas in *M. californicus*, although the lips and ears may be dark brown they do not ordinarily show out in sharp contrast with the rest of the pelage. The wing membranes of *M. subulatus* are usually more blackish than those of *M. californicus.*

Skull.—The skull is delicate and slender, proportioned much as in *Myotis californicus*, but it is slightly longer and broader (compare pl. 1, p. 7, figs. 15 and 14). It differs notably from that of *M. californicus* in the breadth and flatness of the brain case, so that viewed from behind the occiput (pl. 1, p. 7, fig. 11) appears to be less elevated than in the smaller animal, and the summit is actually broader and more flat; there is no abrupt step from rostrum to forehead, but a very gradual upward slope.

On account of the unusual cranial breadth the temporal ridges do not meet until in adult life; they first come together well forward of the occiput, cutting off an isosceles triangle with long tapering point and sometimes forming a low but sharply defined sagittal crest. The base of the triangle projects back with convex outline slightly behind the level of the lambdoid crests.

Teeth.—In form the teeth do not differ appreciably from those of *Myotis californicus.* The crown area of the upper molars is, however, appreciably greater than in the small races of *M. californicus* occurring north of southern Mexico. Taking specimens of the two species from localities in the United States it is seen that the crown of m^2 in *M. californicus* usually measures 1.15 to 1.25 by 1.45 to 1.60, while in *M. subulatus* the usual dimensions are 1.25 to 1.35 by 1.60 to 1.85, a difference which soon becomes obvious to the eye even without direct comparison.

Remarks.—This bat, the animal originally described by Say in 1823 as *Vespertilio subulatus* (not the *Vespertilio subulatus* of Harrison Allen, 1864, and the *Myotis subulatus* of recent authors), seems to be uncommon in the eastern United States, though of general distribution. It has usually been confused with *Myotis lucifugus* in the eastern part of its range as it has been with *M. californicus* in the west. As compared with *Myotis lucifugus* it is distinguishable by smaller size, small foot, and the distinct keel on the calcar; as compared with *Myotis californicus*, by longer thumb (wrist and thumb together usually 8 to 8.5 mm. instead of 6.5 to 7 mm.), larger, more flattened skull, larger teeth (except as compared with *M. californicus mexicanus*) and, in a general way, though not invariably, by more glossy dorsal fur.

In the east it was first recognized by Audubon and Bachman, who, in 1842 described the animal as *Vespertilio leibii* on the basis of a specimen sent by their correspondent Leib from Erie County, Ohio (then Michigan). Their description brings out the characteristic black ears and wings, long tail, very small feet, and small size as compared with *Myotis lucifugus*, which, under the name *Vespertilio virginianus*, they redescribed in the same paper. So little known has the species remained in the region east of the Mississippi River that the name *leibii* has been either lost sight of entirely or regarded as a synonym of *lucifugus*. More recently (1913) the name *Myotis winnemana* was given to the eastern race of the species on the basis of specimens from Maryland and Vermont which Dr. E. W. Nelson saw were not referable to *Myotis lucifugus.*

In 1886 Dr. C. Hart Merriam redescribed the typical arid-plains form as *Vespertilio ciliolabrum*, and four years later he applied the name *melanorhinus* to another race from Arizona. While *ciliolabrum* has been currently recognized as a race of *californicus* the name *melanorhinus* has been placed in the synonymy of *Myotis californicus californicus.* In 1893 H. Allen, apparently again noticing the contrast between *Myotis subulatus melanorhinus* and *M. californicus*, suggested the subspecific name *henshawii* for two specimens from Wingate, N. Mex. Almost exactly the same thing happened 10 years later when Elliot described his *Myotis orinomus* from Lower California.

Not until 1918 were the characters which distinguish *Myotis subulatus* from *Myotis californicus* clearly recognized. They were then pointed out in detail, so far as the forms of the two species occurring in California are concerned, by Mrs. Grinnell, who did not, however, realize that the *orinomus* of Elliot was a race of the species described as *subulatus* by Say.

This animal bears somewhat the same relation to *Myotis californicus* that *M. lucifugus* bears to *M. yumanensis*, in being slightly larger of body, with often distinctly burnished instead of rather constantly lusterless pelage, and in having a larger, flatter skull. Furthermore, the contrast in ranges is similar, for while *Myotis subulatus* and *Myotis lucifugus* extend as species quite across the continent, their lesser counterparts, *M. californicus* and *M. yumanensis*, respectively, are of more restricted distribution, from the humid northwest coast eastward across the Great Basin and southward into Mexico.

The name *subulatus* has been almost universally misapplied to the eastern long-eared *Myotis*, an animal which should be known as *Myotis keenii septentrionalis.* (See p. 107.)

MYOTIS SUBULATUS SUBULATUS (Say)

Vespertilio subulatus SAY, Long's Exped. to Rocky Mts., vol. 2, p. 65 (footnote), 1823 (not of LeConte, 1855, = *lucifugus*, or Harrison Allen, 1864, = *keenii*).

Vespertilio ciliolabrum MERRIAM, Proc. Biol. Soc. Washington, vol. 4, p. 2, December 17, 1886 (near Banner, Trego County, Kans.).

Vespertilio nitidus ciliolabrum H. ALLEN, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 101, March 14, 1894 (part).—TROUESSART, Catal. Mamm. viv. foss., p. 130, 1897.

Myotis californicus ciliolabrum MILLER, North Amer. Fauna, No. 13, p. 72, October 16, 1897 (part).—ELLIOT, Synops. Mamm. North Amer., Field Columb. Mus., publ. 45, zool. ser., vol. 2, p. 404, March, 1901; List Land and Sea Mamm. North Amer., Field Columb. Mus., publ. 57, zool. ser., vol. 2, p. 517, June, 1901.—MILLER and REHN, Proc. Boston Soc. Nat. Hist., vol. 30, p. 257, December 27, 1901.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 93, 1904.—ELLIOT, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool, ser., vol. 6, p. 477, 1905 (part).—WARREN, Mamm. of Colorado, p. 275, 1910 (part).—CARY, North Amer. Fauna, No. 33, p. 209, August 17, 1911 (part).—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 57, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 71, April 29, 1924.

Myotis subulatus WARREN, Mammals of Colorado, p. 275, 1910.—CARY, North Amer. Fauna, No. 33, p. 206, August 17, 1911 (not of Miller, 1897, and most subsequent writers).

Type locality.—On the Arkansas River near present town of La Junta, Otero County, southeastern Colorado.

Type specimen.—All trace of the type specimen has been lost.

Distribution.—Arid plains and eastern Rocky Mountain region from Kansas and southeastern Colorado north to Montana. (See map 12, p. 165.)

Diagnosis.—A pale subspecies, flaxen above and often nearly white below.

Color.—General color of upper parts ranging from "light buff" to "warm buff" with a slight tricolor effect when the hairs are parted so that their paler intermediate portions are seen in contrast with their blackish bases and flaxen tips. The top of the head and the bases of the outer part of the ears are almost whitish, but with a buffy tinge. Muzzle, chin, ears and tragus blackish, the sides of the face from muzzle to ears, blackish brown. The under surface is a very pale buff, becoming nearly white in some individuals; bases of the hairs blackish except at the extreme posterior region of the body.

Measurements.—For measurements see tables, pages 173 and 174.

Specimens examined.—Total number 38, from the following localities:

COLORADO: Chimney Canyon, Avalo, Weld County, 1 skin, 1 alc. (U.S.N.M.); Colorado Springs, 1 mounted (Colorado College).

KANSAS: Banner, Trego County, 6 alc., type and paratypes of *ciliolabrum* (U.S.N.M.); near Castle Rock, Trego County, 2 skins (K. U.).

MONTANA: Big Timber, 1 skin (U.S.N.M.); Miles City, 1 skin (U.S.N.M.).

NEBRASKA: Chadron, 1 alc. (U.S.N.M.).

SOUTH DAKOTA: Custer, 3 skins (U.S.N.M.), 1 alc. (A. M. N. H.); Hermosa, 1 alc. (U.S.N.M.); Pine Ridge, 6 skins (A. M. N. H.).

WYOMING: Bitter Creek, 2 skins (A. M. N. H.); Bull Lake, Shoshone Indian Reservation, 1 alc (U.S.N.M.); Cody, 1 skin (U.S.N.M.); Fort Bridger, 1 skin, nearly typical (U. C.); Greybull, 4 skins (U.S.N.M.); Kinney Ranch, 1 alc. (A. M. N. H.); Otto, 2 skins (A. M. N. H.); Rattlesnake Mountains, 1 skin (U.S.N.M.).

Remarks.—While the series from various localities in the dry interior from South Dakota and Montana to southeastern Colorado is decidedly paler and whiter-bellied than that from New Mexico, Arizona, California, and eastern Oregon, the difference is not always very marked, and the typical race merges into the next by almost imperceptible degrees. This is the only known form of the species in which the underparts are normally so pallid as actually to approach white.

MYOTIS SUBULATUS MELANORHINUS (Merriam)

Vespertilio ciliolabrum Merriam, Proc. Biol. Soc. Washington, vol. 4, p. 4, December 17, 1886 (part; specimens from Grant County, N. Mex.).

Myotis californicus ciliolabrum Cary, North Amer. Fauna, No. 33, p. 209, August 17, 1911 (part; specimen from Snake River, Routt County, Colo.).

Vespertilio melanorhinus Merriam, North Amer. Fauna, No. 3, p. 46, September 11, 1890.—Miller, North Amer. Fauna, No. 13, p. 69, October 16, 1897 (as synonym of *californicus*).—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 308, December 27, 1901.—Lyon and Osgood, Catal. Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 271, January 28, 1909.

Vespertilio albescens melanorhinus H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 91, March 14, 1894.—Trouessart., Catal. Mamm. viv. foss., p. 132, 1897.

Vespertilio nitidus henshawii H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 103, March 14, 1894 (Wingate, N. Mex.).—Miller, North Amer. Fauna, No. 13, p. 69, October 16, 1897 (as synonym of *californicus*).—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 308, December 27, 1901.

Myotis orinomus Elliot, Field Columbian Mus., publ. 79, zool. ser., vol. 3, p. 228, June, 1903 (La Grulla, San Pedro Martir Mountains, Lower California, Mexico, altitude, 8000 feet); Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 577, 1904; Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 476, 1905; Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 502, 1907.—GRINNELL and SWARTH, Univ. California Publ. Zool., vol. 10, p. 138, April 13, 1912.—MILLER, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 57, December 31, 1912.—J. GRINNELL, Proc. California Acad. Sci., ser. 4, vol. 3, p. 278, August 28, 1913.—H. W. GRINNELL, Univ. California Publ. Zool., vol. 17, p. 290, January 31, 1918.—J. GRINNELL, Univ. California Publ. Zool., vol. 21, p. 314, January 27, 1913.—MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 71, April 29, 1924.

Myotis lucifugus longicrus J. GRINNELL, Univ. California Publ. Zool., vol. 5, p. 158, October 31, 1908 (part).

Type locality.—Little Spring, north base of San Francisco Mountain, Coconino County, Ariz.; altitude 8,250 feet.

Type specimen.—Adult male, No. 18684, United States National Museum (Biological Survey collection), collected at San Francisco Mountain, Arizona, August 4, 1889, by Dr. C. Hart Merriam and Vernon Bailey. The specimen after 20 years' immersion in alcohol was made into a skin.

Distribution.—From southern Colorado, southwestward across New Mexico, Arizona, and northern Mexico to the Pacific coast of southern California and northern Lower California, and northwestward into eastern Washington and Oregon. (See map 12, p. 165.)

The distribution in California and the northwest has not yet been wholly worked out. Specimens have been taken in the southwestern part of California, as well as in Nevada, eastern Oregon, and southeastern Washington.

Diagnosis.—Color above richer and less pallid than in the typical subspecies; underparts apparently always strongly tinged with buff and rarely, if ever, approaching white.

Measurements.—For measurements see tables, pages 173 and 174.

Specimens examined.—Total number 119, from the following localities:

ARIZONA: Fort Whipple, 2 skins (U.S.N.M.); Huachuca Mountains, 1 skin (F. M.); Prescott, 1 skin (A. M. N. H.); San Francisco Mountain, 1 skin, type (U.S.N.M.); Santa Catalina Mountains, 1 alc. (A. M. N. H.); White Mountains, 1 skin (A. M. N. H.).

CALIFORNIA: 8 miles west of Bakersfield, Kern County, 5 skins (U. C.); Carroll Creek, Inyo County, 1 skin (U. C.); Dulzura, San Diego County, 1 skin (A. M. N. H.), 3 alc., 1 skull (U.S.N.M.), 8 alc. (A. N. S. P.), 4 skins (U. C.); Jacumba, San Diego County, 1 skin (A. M. N. H.); Kern River, Tulare County, 1 alc. (U.S.N.M.); Owen Valley, Inyo County, 1 alc. (U.S.N.M.); San Bernardino Mountains, 1 skin (U. C.), 1 skin (U.S.N.M.); San Diego County, no exact locality, 1 skull (U.S.N.M.); San Jacinto Mountains, Riverside County, 1 skin (U. C.), 3 alc. (U.S.N.M.); Santa Rosa Mountains, Riverside County, 4 skins (U. C.); Santa Ysabel, Orange County, 12 alc. (U.S.N.M.); Twin Oaks, San Diego County, 1 alc. (U.S.N.M.); Walker Pass, Kern County, 1 skin (U. C.); Warm Spring, near Vallecito, San Diego County, 1 skin (U. C.); White Mountains, Inyo County, 1 skin (U. C.); Witch Creek, San Diego County, 1 alc. (U.S.N.M.); Yosemite Valley, 1 skin (U.S.N.M.).

CHIHUAHUA: San Luis Mountains, 1 skin (U.S.N.M.).

COLORADO: Antonite, 1 skin (U.S.N.M.); Snake River, Routt County, 1 skin, 1 alc. (U.S.N.M.).

LOWER CALIFORNIA: La Grulla, 3 skins, including type of *orinomus* (F. M.), 5 skins (U.S.N.M.); Hanson Laguna, 1 skin (U.S.N.M.); Santa Eulalia, 1 skin (U.S.N.M.); Vallecitos, 1 skull (F. M.).

NEVADA: Cottonwood Range, Humboldt County, 2 alc. (U.S.N.M.); Little High Rock Canyon, Washoe County, 2 skins (U. C.); Panaca, 1 alc. (U.S.N.M.); Rabbit Hole Mountains, 1 skin (U.S.N.M.); Pablo, 1 alc. (U.S.N.M.).

NEW MEXICO: Cantonment Burgwin, 1 skin (U.S.N.M.); Fort Wingate, 2 alc. (U.S.N.M.); Guadalupe Canyon, 1 skin (U.S.N.M.); Las Vegas, Hot Springs, 1 alc. (U.S.N.M.); Mount Capitan, 1 skin (U.S.N.M.); Pecos, 1 skin (U.S.N.M.); Santa Rosa, 2 skins (U.S.N.M.); Silver City, 1 skin (U.S.N.M.); Tres Piedras, 1 skin (U.S.N.M.); Wingate, 1 skull (U.S.N.M.); Zuni Mountains, 1 skin (U.S.N.M.).

OREGON: Barnes, Crook County, 1 skin (U. C.); Homestead, 1 skin, approaching *ciliolabrum* (U.S.N.M.); McDermitt, Malheur County, 2 skins (U.S.N.M.); Millers, mouth of Deschutes River, 4 skins (U.S.N.M.); Riverside, 3 skins (U.S.N.M.); Rockville, Malheur County, 1 skin (U.S.N.M.); Rome, Malheur County, 1 skin (U.S.N.M.); Sheaville, 1 skin (U.S.N.M.); Skull Spring, 1 skin (U.S.N.M.); Twelve Mile Creek, 2 alc. (U.S.N.M.); Warner Valley, 1 skin (U.S.N.M.).

TEXAS: Terlingua Creek, 1 skull (U.S.N.M.).

WASHINGTON: Bly, 1 skin (U.S.N.M.); Goldendale, 2 alc. (U.S.N.M.).

Remarks.—Owing to paucity of specimens and the difficulties of comparing alcoholic material with skins, previous writers have not recognized Merriam's *Vespertilio melanorhinus.* With the better series now at hand, however, it becomes clear that this animal is really a form of *Myotis subulatus*, and not identical with *M. californicus* as had at first seemed to be the case. The name *Vespertilio nitidus henshawii* of Harrison Allen, based on two females taken by Mr. H. W. Henshaw near Wingate, N. Mex., probably refers to the same animal. These specimens appear to be no longer in the National Museum collection, but two taken at Fort Wingate by Dr. R. W. Shufeldt are referable to *melanorhinus.* Elliot's *Myotis orinomus* from northern Lower California is also a synonym of *M. subulatus melanorhinus.* The species has been more often collected in the portion of its range occupied by this race than it has been in the eastern United States.

MYOTIS SUBULATUS LEIBII (Audubon and Bachman)

Vespertilio leibii Audubon and Bachman, Journ. Acad. Nat. Sci. Philadelphia, ser. 1, vol. 8, p. 284, 1842.—H. Allen, Monogr. Bats North Amer., Smithsonian Misc. Coll., No. 165, p. 80, June, 1864; Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 190, March 14, 1894.—Miller, North Amer. Fauna, No. 13, p. 29, October 16, 1897.

Myotis winnemana Nelson, Proc. Biol. Soc. Washington, vol. 26, p. 183, August 8, 1913 (Plummer Island, Md.).—Elliot, Check-List Mamm. North Amer., suppl., p. 156, 1917.—Miller, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 71, April 29, 1924.

Type locality.—Erie County, Ohio.

Type specimen.—Collected in Erie County, Ohio (formerly Michigan), by Dr. George C. Leib, and sent to Audubon and Bachman at Philadelphia, but not now known to be in existence.

Distribution.—From Vermont, New York, and Ohio south to West Virginia and Kentucky; exact limits of range not yet ascertained. (See map 12, p. 165.)

The few specimens at hand probably indicate fairly well the general range, though the southern limits will doubtless be found to extend to Florida. Intergradation with the pale race of the Plains country probably takes place west of the Mississippi.

Diagnosis.—General color much darker than in the typical subspecies and closely resembling that of *Myotis lucifugus lucifugus* in the olive phase, but slightly more golden above and lacking the dark spot at the shoulder.

Color.—Upper surface of body, from forehead to base of tail, nearly "ochraceous tawny" with a golden sheen in some lights due to the shining tips of the long hairs; on the sides of the neck the tint is a little brighter. Lower surface "warm buff," the tips of the hairs slightly burnished. Bases of the hairs on the body everywhere blackish, except at the extreme sides. The face from the nose to base of ears and including the lower lip, black, giving a masked appearance, which is heightened by the dull black ears, tragus, nose and chin. Wings and membranes blackish brown.

Skull.—Although nearly as long as that of *Myotis lucifugus*, the skull is so flattened that it has a notably less depth; the brain case is distinctly narrower.

Measurements.—For measurements see tables, pages 173 and 174.

Specimens examined.—Total number 8, from the following localities:

KENTUCKY: Hickman's Cave, 1 alc. (M. C. Z.).
MARYLAND: Plummer Island, 2 skins (U.S.N.M.).
NEW YORK: Sing Sing, 2 alc. (U.S.N.M.).
WEST VIRGINIA: White Sulphur Springs, 1 skin (M. C. Z.).
VERMONT: Brandon, 1 skin (U.S.N.M.); Proctor, 1 skin (U.S.N.M.).

Remarks.—This smallest of the bats known to occur in the eastern United States seems to be much less common than *Myotis lucifugus lucifugus*, and the few specimens that have been taken have usually been confused with the better known animal. Its black ears and facial mask, rather golden tint, keeled calcar and shorter forearm (31 to 34 mm. instead of 36 to 40 mm.) will at once distinguish it, however. Though described by Audubon and Bachman eighty years ago, it was not again recognized until Nelson redescribed it in 1913 as *Myotis winnemana.*

External measurements of Myotis subulatus

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis subulatus subulatus													
South Dakota: Hermosa	60949	♂	41.6	38.0	15.0	6.8	33.2	5.4	30.0	30.0	13.6	11.4	8.6
Wyoming: Bull Lake	55845	♀	39.4	39.8	14.4	6.4	31.6	6.0	29.0	28.4	14.0	12.2	8.4
Colorado:													
Colorado Springs	C. C.	----	38.0	35.4	14.2	7.4	34.0	5.2	29.4	29.2	13.2	10.0	-----
Avalo	203960	♂	38.6	37.0	14.2	6.2	33.8	5.6	30.6	30.0	14.0	10.8	8.8
Kansas:													
Trego County	[1] 186444	♀	41.4	36.0	14.8	7.0	34.0	6.2	32.0	31.4	13.4	11.4	9.4
Do	187404	♂	41.0	37.8	14.2	6.8	33.0	5.4	29.8	29.4	13.0	10.0	9.4
Do	187403	♂	41.6	37.0	14.0	7.4	32.6	6.2	30.6	29.8	14.0	11.4	9.6
Do	187406	♀	42.0	37.2	15.0	7.0	34.2	4.8	31.8	31.6	13.6	12.0	10.0
Do	187407	♀	42.2	40.6	14.0	7.2	34.4	5.0	31.4	30.8	14.2	11.4	9.6
Do	187408	♀	36.0	37.4	14.0	6.8	32.0	5.4	29.0	28.8	13.0	11.4	8.0
Nebraska: Chadron	60950	♀	44.0	41.4	14.4	6.4	34.0	5.4	31.2	29.8	13.2	11.2	10.4
Montana:													
Big Timber	226100	♂	42.2	35.0	15.0	7.0	31.4	5.4	29.6	29.2	-----	-----	-----
Miles City	229525	♀	44.0	35.4	15.0	6.8	32.2	5.4	29.0	29.0	-----	-----	-----
Myotis subulatus melanorhinus													
Washington:													
Goldendale	92629	♀	42.2	38.8	14.0	6.0	32.0	5.8	30.2	29.6	13.0	12.0	9.0
Do	92636	♀	38.8	41.0	14.2	7.0	33.0	5.2	30.2	30.2	13.2	11.0	8.8
Oregon:													
John Day River	79301	♂	37.0	34.8	14.2	6.2	31.0	5.0	29.8	29.4	12.2	10.2	9.0
Do	79302	♀	34.4	34.0	14.0	6.0	31.0	5.4	29.0	29.6	13.6	10.8	8.0
Do	79303	♀	35.6	41.0	14.2	6.0	33.0	5.8	30.0	29.4	13.0	11.4	8.4
Twelve Mile Creek	79297	♀	39.4	41.0	14.2	6.0	33.0	5.8	31.4	31.0	13.0	11.2	8.0
Do	79306	♀	38.0	38.4	14.4	6.0	33.4	5.4	32.0	31.4	13.2	12.2	9.0
Nevada:													
Cottonwood Range	80909	♂	40.8	39.4	14.4	6.0	32.4	5.0	29.8	29.4	13.0	11.8	8.6
Pablo	209857	♀	39.2	39.6	13.2	6.2	33.8	5.6	32.0	31.2	12.8	11.4	10.0
Panaca	28949	♂	39.0	38.0	15.0	6.4	33.6	5.2	31.8	31.2	13.2	12.0	9.4
Colorado: Snake River	147770	♀	38.0	37.4	14.4	6.4	32.4	5.4	29.6	28.2	13.2	11.0	8.4
New Mexico:													
Fort Wingate	199720	♀	44.0	37.8	14.6	6.0	33.2	6.0	30.0	30.0	15.0	13.0	9.2
Do	199721	♀	44.0	40.4	15.0	6.8	33.0	5.0	32.2	31.0	14.0	12.8	9.2
Las Vegas	112014	♂	42.0	39.0	15.0	6.4	33.6	5.2	31.4	30.4	13.0	12.0	9.4
Arizona: San Francisco Mountain	[2] 18684	♂	37.4	36.2	14.6	7.0	32.4	5.0	31.4	30.0	-----	-----	-----
California:													
Twin Oaks	52803	♀	43.6	38.6	14.4	6.0	32.4	5.0	31.0	30.0	14.2	11.2	8.0
Witch Creek	59506	♀	43.6	43.2	16.2	6.6	35.4	6.0	34.4	33.0	14.2	11.4	10.0
Do	62866	♀	43.2	39.4	15.0	6.2	32.6	5.8	32.0	31.0	13.4	11.6	9.0
Dulzura	52804	♀	41.2	39.6	14.0	6.2	30.8	5.0	30.4	29.0	13.2	11.0	8.4
Do	52805	♀	40.0	39.4	-----	5.6	33.0	5.2	30.4	30.0	13.2	11.0	8.8
Do	52806	♀	43.2	40.0	14.8	6.0	33.0	5.0	31.2	30.4	13.0	12.0	8.8
Kern River	29847	♀	43.4	39.4	16.6	7.0	36.0	5.0	33.0	31.0	14.6	11.0	9.6
Owen Valley	29807	♀	43.0	40.4	15.0	6.8	35.6	5.2	33.8	32.6	15.0	11.0	10.0
San Jacinto Mountains	62868	♂	42.8	32.6	14.4	6.2	33.6	5.2	31.6	30.8	14.2	11.4	10.0
Santa Ysabel	60538	♀	41.0	38.4	13.8	6.4	33.4	5.0	32.0	30.8	13.2	12.2	9.0
Do	60540	♀	40.2	37.0	14.8	6.2	32.6	5.0	31.6	30.4	14.2	11.4	9.2
Do	60544	♀	40.2	37.6	14.6	6.2	33.4	5.0	31.8	31.0	13.8	12.0	9.0
Do	60549	♀	40.2	35.8	14.6	6.2	34.0	5.0	31.8	31.8	13.4	10.8	9.0
Do	60550	♀	40.0	39.6	15.0	5.8	33.4	4.2	31.8	31.0	12.2	11.4	9.0
Do	60551	♀	40.2	40.0	15.6	6.0	35.2	5.4	33.0	32.6	14.0	11.8	9.2
Lower California: La Grulla	[3] 10848 F.M.	----	"48"	"40"	14	6.8	-----	5.6	32.0	31.6	"14"	-----	-----
Myotis subulatus leibii													
New York:													
Sing Sing	71926	♂	43.6	33.4	14.0	7.0	31.0	6.0	27.6	28.8	12.2	10.2	8.8
Do	187853	♂	44.0	33.2	14.0	6.6	31.0	5.0	30.8	28.0	13.0	10.6	9.0
Maryland:													
Plummer Island	150274	♂	43.6	35.2	14.0	6.6	30.8	5.2	27.6	27.6	-----	-----	-----
Do	[4] 150275	♂	43.2	29.8	14.4	6.6	31.0	5.8	28.8	28.0	-----	-----	-----
Vermont:													
Brandon	202783	♀	47.0	30.0	15.0	7.0	33.0	6.0	31.0	30.0	-----	-----	-----
Proctor	224614	♀	48.0	34.0	14.2	6.8	34.0	5.0	29.8	29.0	-----	-----	-----

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[1] Type of *Vespertilio ciliolabrum* Merriam.

[2] Type.

[3] Type of *Myotis orinomus* Elliot.

[4] Type of *Myotis winnemana* Nelson.

Cranial measurements of Myotis subulatus

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m³	Mandibular tooth row	Wear of teeth
Myotis subulatus subulatus													
Montana: Miles City	229525	♀	13.6	13.0	8.4	3.2	6.5	4.4	9.8	5.0	5.2	5.5	0
South Dakota:													
Custer	116778	♂	14.5	13.9	8.5	3.1	6.7	4.4	10.0	5.4	5.4	5.8	0
Do	116779	♂	13.7	13.2	8.4	3.0	6.6	4.3	10.0	5.1	5.3	5.5	0
Do	116780	♂	13.6	13.0	8.4	3.0	6.5	4.3	9.5	4.9	5.3	5.3	2
Hermosa	60949	♂	13.6	12.9	----	3.2	6.8	4.0	10.0	5.1	5.1	5.6	0
Wyoming:													
Rattlesnake Mountains	160596	♂	-----	-----	8.0	3.0	6.2	4.4	9.9	5.0	5.4	5.5	0
Greybull	168984	♂	13.7	13.2	8.5	3.3	6.8	4.5	10.0	5.3	5.2	5.6	1
Do	168985	♂	13.8	13.0	8.3	3.1	6.5	4.3	10.0	5.3	5.4	5.7	0
Do	168908	♀	13.8	13.0	8.4	3.4	6.5	4.3	10.0	5.0	5.0	5.5	3
Do	168937	♀	13.6	13.0	8.0	3.1	6.6	4.4	10.0	5.1	5.1	5.6	0
Colorado: Avalo	159715	♂	14.0	13.2	9.0	3.2	6.8	4.4	10.0	5.4	5.6	5.8	1
Kansas:													
Banner	187403	♂	14.5	13.8	9.0	3.4	7.0	4.4	10.2	5.4	5.5	5.6	1
Do	187404	♂	14.0	13.3	----	3.2	6.8	4.4	10.0	5.2	5.0	5.6	0
Do	187406	♂	14.6	13.4	----	3.0	6.8	4.6	10.2	5.2	5.3	5.6	1
Do	[1] 186444	♀	14.2	13.2	8.4	3.2	7.0	4.5	10.4	5.4	5.6	6.0	1
Do	187407	♀	14.5	13.8	----	3.2	6.8	4.4	10.2	5.4	5.4	5.9	1
Do	187408	♀	14.0	13.4	----	3.2	6.6	4.4	10.0	5.4	5.4	5.7	0
Nebraska: Chadron	60950	♀	13.8	13.5	----	3.2	6.8	4.6	10.0	5.2	5.6	5.6	2
Myotis subulatus melanorhinus													
Washington: Bly	232639	♂	13.8	13.1	----	3.2	6.6	4.3	10.0	5.3	5.2	5.6	2
Oregon:													
Millers	206830	♀	13.5	13.0	8.0	3.0	6.4	4.0	9.7	5.1	5.2	5.6	0
Do	206831	♂	13.5	13.1	----	2.9	6.3	4.0	9.7	5.0	5.1	5.3	2
Riverside	213910	♂	13.4	12.8	----	3.0	6.5	4.0	9.7	5.0	5.1	5.4	1
California:													
Santa Rosa Mountains	2045 U.C.	♂	14.0	13.2	8.7	3.1	6.6	4.3	10.2	5.3	5.4	5.7	1
Do	2046	♂	14.0	13.2	----	3.0	6.6	4.4	10.0	5.5	5.6	5.6	1
Near Bakersfield	28048	♀	14.1	13.5	8.8	3.1	6.6	4.6	10.4	5.3	5.4	----	2
Do	28049	♀	13.8	13.3	----	3.0	6.4	4.2	10.1	5.3	5.3	5.5	2
Do	28050	♀	14.5	13.8	8.6	3.2	6.5	4.4	10.8	5.5	5.2	6.0	1
Colorado: Snake River	148160	♀	14.0	13.0	----	3.2	6.4	4.4	10.0	5.4	----	5.6	1
Lower California:													
La Grulla	[2] 10848 F.M.	♂	14.4	13.6	8.7	3.2	6.6	4.4	10.2	5.2	5.5	5.7	2
Do	138549	♂	14.3	13.2	8.7	3.2	6.8	4.4	10.2	5.4	5.5	5.8	2
Do	138550	♂	14.2	13.7	8.6	3.2	6.6	4.2	10.4	5.4	5.4	5.9	2
Nevada: Rabbit Hole Mountains	94382	♂	13.9	13.2	----	3.2	6.6	4.3	-----	5.3	5.3	5.6	1
Texas: Terlingua Creek	130986	----	13.5	12.9	8.6	3.3	6.7	4.8	10.1	5.1	5.3	5.6	2
New Mexico:													
Fort Wingate	102426	♀	14.7	13.7	9.0	3.1	6.8	4.7	10.7	5.5	5.6	5.7	2
Zuni Mountains	160075	♂	14.1	13.6	----	3.1	6.7	4.5	10.2	5.4	5.6	5.8	2
Mount Capitan	97374	♂	14.0	13.4	8.5	3.0	6.7	4.3	10.0	5.4	5.4	5.8	0
Silver City	66117	♀	14.3	13.8	9.0	3.3	7.0	4.6	10.7	5.5	5.6	5.8	1
Arizona:													
San Francisco Mountain	[3] 18684	♂	14.3	13.4	----	3.3	6.6	4.3	10.5	5.4	5.4	5.7	1
Catalina Mountains	12507 A.N.S.P.	♂	14.7	14.0	9.0	3.1	7.0	4.8	10.8	5.5	5.7	6.0	1
Myotis subulatus leibii													
Vermont: Brandon	202783	♀	14.2	13.6	----	3.4	7.1	4.0	10.0	5.0	5.3	5.6	1
New York:													
Sing Sing	38734	♂	-----	-----	----	3.2	----	----	9.4	5.0	5.0	5.4	0
Do	187853	♂	13.6	13.0	8.0	3.2	6.8	4.0	9.6	5.0	5.0	5.4	1
Maryland: Plummer Island	[4] 150275	♂	14.2	13.4	----	3.2	6.8	4.3	9.8	5.2	5.0	5.5	2
West Virginia: White Sulphur Springs	6921 M.C.Z.	♂	13.2	12.5	----	3.0	6.9	4.1	9.4	5.0	5.0	5.2	0

[1] Type of *Vespertilio ciliolabrum* Merriam.

[2] Type of *Myotis orinomus* Elliot.

[3] Type.

[4] Type of *Myotis winnemana* Nelson.

II. THE SPECIES OF MYOTIS OCCURRING IN TROPICAL AND SOUTH AMERICA

MYOTIS NIGRICANS (Wied)

(Synonymy under subspecies)

Distribution.—From southern Mexico (Chiapas and Yucatan) southward over the warmer parts of South America (including the coastal islands) to Paraguay and southeastern Brazil; islands of Grenada and Dominica in the Lesser Antilles.

Diagnosis.—A small bat not very unlike the North American *Myotis californicus* in size and general characters, but tail less elongated (ratio of tail to head and body in series of specimens averaging about 85), foot relatively larger, the average ratio of its length to that of tibia usually more than 45 and in some races as great as 53; ear, when laid forward, extending about to end of muzzle, usually not reaching to nostril but occasionally going beyond it; metacarpals 3 to 5 very slightly graduated, the distal end of the fifth, when folded back, not reaching the elbow by about 2 mm.; texture of pelage varying from rather short and wooly to long and silky, the longer hairs, when well developed, with glossy tips, these, however, rarely if ever producing a noticeable sheen; color usually dark brown or blackish (rarely grayish or ochraceous), the bases of the hairs not strongly contrasted with the tips; a tawny dichromatic phase rarely present; skull and teeth with no marked peculiarities; forearm 31.6 to 39 mm. usually less than 37 mm.; greatest length of skull ranging from 12.6 to 14.7 mm., usually less than 14.5 mm.; maxillary tooth row 4.7 to 5.6 mm., usually less than 5.5 mm.; mandibular tooth row 5.0 to 6.0 mm., usually less than 5.6 mm.; crowns of upper molars small, m^2 usually varying from 1.15 to 1.30 by 1.55 to 1.70 mm.

Ears.—The ear is narrow and delicate (usually 11 to 13 mm. in height from meatus), its anterior border convex to the blunt tip, the posterior border slightly concave below the tip, then convex to the projecting shoulder of the basal two-fifths. When laid forward the tip of the ear reaches about to the end of the muzzle or a little beyond. Tragus about half the height of the ear, with a small basal lobe, marked off by a shallow notch, above which is the broadest part of the tragus. The tip is slightly attenuate and shows a few minute crenulations on the outer edge.

Wing and membranes.—The wing membrane arises from the side of the foot at the base of the outer toe. Metacarpals 3 to 5 slightly graduated or sometimes the fourth and fifth are about equal and only minutely less than the third. Taking the third finger as 100, the fourth and fifth are respectively as 85 and 78 (59:50.5:46.5 mm.). When the wing is folded the end of the third metacarpal falls short of the elbow by about 2 mm. Practically the entire tail is included within the membrane, though occasionally a minute tip is free. The fur of the body extends out on the uropatagium, both above and below, to or a little beyond a line joining the knees.

Foot.—The foot is small and delicate in proportion with the general small size of the animal. In series of specimens from different localities the average ratio of foot to tibia ranges from about 43 to about 53. Calcar a little shorter than the free border of the interfemoral membrane (about 14:19 mm.), often though not constantly provided with a small keel, and usually ending in a minute projecting lobule.

Fur and color.—The pelage is soft but not especially full and silky in quality; the hairs on the back about 5 mm. in length. The color of the hairs is everywhere blackish plumbeous at base; tips brown with a faint gloss and usually so dark as to present no conspicuous contrast with the under color; entire ventral surface less darkened and more tinged with yellowish than back. There is a slight tendency to dichromatism shown by the rare occurrence of individuals with orange-suffused pelage.

Skull.—The skull is small and delicately formed. Profile of the forehead rising rather abruptly; brain case distinctly globular. The temporal ridges often form a distinct though low sagittal crest. The rostrum is relatively broad in proportion to its length, with the width across the molars slightly exceeding the length of the maxillary tooth row (front of canine to back of last molar).

Teeth.—The two minute upper premolars stand usually full in the tooth row, though rarely the second may be crowded inward from the line. The cingulum is distinct and the cusp of the posterior tooth reaches about half way to the tip of the anterior. The upper molars resemble those of the North American *Myotis lucifugus* in the full development of the secondary cusps and ridges and in the breadth and distinctness of the cingulum. The transverse diameter of the crown in m^1 and m^2 is less proportionately to the antero-posterior diameter than in *M. lucifugus.*

Remarks.—*Myotis nigricans* is a bat peculiar to the warmer parts of America. Its range probably meets that of *Myotis californicus* in southern Mexico. Though allied to *M. californicus* and structurally not very different from it, *Myotis nigricans* is undoubtedly a distinct species characterized by the almost uniform coloration of the hairs from base to tip, the shorter third metacarpal (which does not reach the elbow as it usually does in *M. californicus*), more robust foot and shorter tail and ears. The skull has a slightly more elevated occiput, and the width across the molars is increased so that this distance tends to be perceptibly greater than the maxillary tooth row instead of about equal to it.

Of the technical names applied to this animal before 1850, *Vespertilio brasiliensis* of Spix, 1823, is clearly the oldest, although the exact locality at which the type was obtained is not stated. It was preoccupied by *Vespertilio brasiliensis* Desmarest, 1822, a name based on a species of *Eptesicus*, hence Fischer replaced it by *Vespertilio spixii* in 1829. Meanwhile, however, Wied (1826) had described the species as *V. nigricans*. Although no specimens from the plains of the Mojos country, eastern Bolivia, have been seen, it seems clear, from the description of *Vespertilio hypothrix* D'Orbigny and Gervais, that the form which occurs in this region is the same as typical *nigricans*. Whether or not Temminck's *Vespertilio parvulus* should be placed in the synonymy of *Myotis nigricans* is not altogether clear. The description gives little that is diagnostic. The specimens on which it was based were collected by Natterer in Brazil. Dobson, however, who directly compared an alcoholic specimen of *nigricans* with Temminck's type of *parvulus* in the Leiden Museum, considered the animals identical. Another possible synonym is *Vespertilio nitens* of Wagner, based on Natterer's drawing. Wagner's figure, however, shows a short tragus, unlike that of any known *Myotis*. Recently the red phase of *Myotis nigricans* has been named as a small form of *M. ruber* (J. A. Allen, 1914).

Several local forms of *Myotis nigricans* have been described during the past forty years. It is possible that some of them will eventually prove to be worthy of recognition; but on the basis of the insufficient material now at hand we have found it impossible to frame diagnoses or to map approximate areas of distribution. We have therefore placed the names *bondæ*, *caucensis*, *chiriquensis*, *maripensis*, and *punensis* in synonymy, where they may safely remain until some one provided with adequate series of skins shall be able to show that the forms to which they were applied have an actual independent status. At present we are forced to regard all the material of the kind hitherto referred to the *nigricans* group from South America and from Central America north to Guatemala as pertaining to the typical race, an animal which varies noticeably in color within rather narrow limits, but which is constantly large in size for the species. Along the extreme northern border of the range of *M. nigricans* three small local forms have been developed, one in southern Mexico, and one each on the islands of Curaçao and Dominica.

MYOTIS NIGRICANS NIGRICANS (Wied)

Vespertilio brasiliensis Spix, Sim. et Vespert. Brasil. Sp. Nov., p. 63, pl. 36, fig. 8, 1823 (not of Desmarest, 1822).

Vespertilio nigricans Wied, Beiträge z. Naturg. Brasil, vol. 2, p. 266, 1826.—Fischer, Synopsis Mamm., p. 112, 1829.—Temminck, Monogr. de Mamm., vol. 2, p. 242, 1840.—Schinz, Syst. Verzeich. Säugeth. oder Synopsis Mamm., vol. 1, p. 185, 1844.—Wagner, Schreber's Säugth., Suppl., vol. 1, p. 533, 1844.—Dobson, Catal. Chiroptera Brit. Mus., p. 319, pl. 19, fig. 9, 1876.—Winge, E Mus. Lundii, Zool. Mus. Univ. Copenhagen, vol. 2, art. 1, p. 13, pl. 2, fig. 3, 1892.—Allen and Chapman, Bull. Amer. Mus. Nat. Hist., vol. 5, p. 231, September 21, 1893.—Trouessart, Catal. Mamm., viv. foss., p. 130, 1897.—Pira, Zool. Anzeiger, vol. 28, p. 18, 1904.

Vespertilio spixii Fischer, Synopsis Mamm., p. 111, 1829 (new name for *V. brasiliensis* Spix).

Vespertilio parvulus Temminck, Monogr. de Mamm., vol. 2, p. 246, 1840 (Brazil).—Von Pelzeln, Verh. K. K. Zool.-Bot. Ges. Wien, vol. 33, Beiheft, p. 45, 1833.

Nyctophylax parvulus Fitzinger, Sitzungsber. Akad. Wiss. Wien, vol. 62, pt. 1, p. 563, 1870.

Vespertilio hypothrix D'Orbigny and Gervais, Voy. dans l'Amér. Mérid., vol. 4, pt. 2, mammifères, pp. 14 (footnote), 16, 1847 (eastern Bolivia).—Gervais, Expéd. Amér. du Sud du Castelnau, zool., mammifères, p. 83, pl. 15, fig. 5 (teeth), 1855.

Vespertilio hypothryx D'Orbigny and Gervais, Voy. dans l'Amér. Mérid., vol. 4, pt. 2, mammifères, p. 16, 1847.

Vespertilio concinnus H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 280 (San Salvador).—Miller, Proc. Biol. Soc. Washington, vol. 13, p. 154, June 13, 1900 (part).—J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 384. July 9, 1914.

Vespertilio exiguus H. Allen, Proc. Acad. Nat. Sci. Philadelphia, 1866, p. 281 (Aspinwall=Colon, Panama).—Lyon and Osgood, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 290, January 29, 1909.

Aeorestes nigricans Fitzinger, Sitzungsber. Akad. Wiss. Wien. vol. 62, pt. 1, p. 432, 1870.

Vesperugo nigricans von Pelzeln, Verh. K. K. Zool.-Bot. Ges. Wien, vol. 33, Beiheft, p. 45, 1883.

Vespertilio cincinnus H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 97, footnote, March 14, 1894.

Myotis nigricans Miller, North Amer. Fauna, No. 13, p. 74, October 16, 1897 (part, synonymy).—Thomas, Ann. and Mag. Nat. Hist., ser. 7, vol. 8, p. 436, November, 1901.—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 257, December 27, 1901 (part).—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 575, 1904 (part).—Trouessart, Catal. Mamm. viv. foss., suppl., p. 93, 1904 (part).—J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 20, p. 77, February 29, 1904; p. 343, October 8, 1904.—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 475, 1905 (part); Catal. Mamm. Field Columb. Mus., Field Columb. Mus., publ. 115, zool. ser., vol. 8, p. 501, 1907 (part).—Osgood, Field Mus. Nat. Hist., publ. 176, zool. ser., vol. 10, p. 181, April 20, 1914.—Goldman, Smithsonian Misc. Coll., vol. 69, No. 5, p. 213, April 24, 1920.

Myotis chiriquensis J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 20, p. 77, February 29, 1904 (Boqueron, Chiriqui, Panama).—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 576, 1904; Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 475, 1905 (part).—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 58, December 31, 1912 (part).—Goldman, Smithsonian Misc. Coll., vol. 69, No. 5, p. 213, April 24, 1920.—Anthony, Bull. Amer. Mus. Nat. Hist., vol. 35, p. 373, June 9, 1916.

Myotis nigricans concinnus Osgood, Field Mus. Nat. Hist., publ. 155, zool. ser., vol. 10, p. 65, January 10, 1912.

Myotis nigricans mundus OSGOOD, Field Mus. Nat. Hist., publ. 176, zool. ser., vol. 10, p. 182, April 20, 1914 (not of H. Allen=*M. albescens*).

Myotis simus OSGOOD, Field Mus. Nat. Hist., publ. 176, zool. ser., vol. 10, p. 182, April 20, 1914 (not of Thomas).

Myotis ruber keaysi J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 383, July 9, 1914 (Inca Mines, Peru, Lat. 13° 30′ S., Long. 70 W., altitude, 6,000 feet). Red phase.

Myotis punensis J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 383, July 9, 1914 (Puna Id., Ecuador).

Myotis bondæ J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 384, July 9, 1914 (Bonda, Santa Marta, Colombia).

Myotis maripensis J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 385, July 9, 1914 (Maripa, Rio Caura, Venezuela).

Myotis esmeraldæ J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 385, July 9, 1914 (Esmeraldas, Ecuador).

Myotis caucensis J. A. ALLEN, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 386, October 30, 1914 (Rio Frio, Colombia).

Myotis nigricans nigricans MILLER, List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 72, 1924 (part).

Type locality.—Fazenda de Aga, near the Rio Iritiba, province of Espirito Santo, eastern Brazil.

Type specimen.—The type was collected, about 1823, by Prince Maximilian zu Wied. Its present whereabouts, if it is still in existence, is not known.

Distribution.—Central and South America from Guatemala to southern Brazil and from coast to coast.

Diagnosis.—Size maximum for the species; greatest length of skull usually more than 13.5 mm. and not infrequently more than 14 mm. (known maximum 14.7); foot usually less than half as long as tibia (average ratio of foot to tibia in series of ten examples from single localities ranging from 44.6 to 49.1); ear usually not extending beyond nostril when laid forward.

Color.—The general color above, when the fur is smoothed so that the blackish-slate bases of the hairs do not appear on the surface, is a brown near the Mars brown of Ridgway, usually darker and more blackish but occasionally lighter and more nearly approaching Prout's brown or russet. Sometimes there is a decided tinge of gray or ocher, especially on the neck and head. Underparts not so dark as back, and often with a buffy or yellowish cast. In the red phase the color is suffused with orange, producing a brown very near to the Sudan brown of Ridgway.

Measurements.—For measurements see tables, pages 184 and 187.

Specimens examined.—Total number 648, from the following localities:

BOLIVIA: Balzan, 4 alc. (B. M.); Buenavista, 3 skins (A. M. N. H.); Caiza, 4 alc. (B. M.); Rosario, 4 alc. (U.S.N.M.); Rio Surutu, Dept. Santa Cruz, 5 skins (A. M. N. H.); Rurrenebaque, Beni, 1 alc. (U.S.N.M.); Santa Cruz Province, 8 alc. (B. M.); no exact locality, 2 skins (B. M.).

BRAZIL: Bahia, 4 skins, (B. M.); Chaco, 1 alc. (B. M.); Benevides, 1 alc. (B. M.); Lagoa Santa, 6 alc. (M. C. Z.); Linhares, 1 alc. (M. C. Z.); Macao, 1 alc. (M. C. Z.); Minas Geraes, 1 alc. (M. C. Z.); Minas Geraes, Rio Jordão, near Araguary, 1 skin (B. M.); near Para, 1 skin, 1 alc. (B. M.); Parana Prov., Palmeiras. 2 alc. (B. M.); Pernambuco, 1 skin, 1 alc. (B. M.); Rio Grande do Sul, San Lorenzo, 3 alc. (B. M.); Rio Janeiro, 1 skin, 2 alc. (B. M.); Samarão (Bahia), 6 skins (B. M.), 1 skin (M. C. Z.); Santa Catherina, 1 skin (B. M.); São Paulo, 2 alc. (M. C. Z.); São Paulo, Cruzeiro, 1 skin, 1 alc. (B. M.); São Paulo, São Sebastian, 44 skins (U.S.N.M.). 9 skins (B. M.), 2 skins (F. M.); Serra do Itatiaya, 1 skin (A. M. N. H.); interior. 2 alc. (U.S.N.M.); no exact locality, 2 skins (B. M.).

BRITISH GUIANA: Moon Mountains, 14 skins (B. M.); Upokarit Kanuku Mountains, 6 skins, 3 alc. (B. M.).

BRITISH HONDURAS: Stann Creek, 1 alc. (U.S.N.M.).

COLOMBIA: Bogota. 1 alc. (B. M.); Bonda, 25 skins, including type of *bondæ* (A. M. N. H.); Buenavista, 3 skins (A. M. N. H.); Cauca River, 1 skin (U.S.N.M.); Choco region, 1 skin, (B. M.), 1 alc. (M. C. Z.); Jimenez, 1 skin (U.S.N.M.), 3 skins (B. M.); Juntas de Tamana, Cauca, 3 skins (A. M. N. H.); Palomino, 1 skin (M. C. Z.); Rio Frio, Cauca River, 1 skin, type of *caucensis* (A. M. N. H.); Santa Marta, 3 skins. 6 alc. (M. C. Z.), 1 skin (B. M.); ? Valdivia, 8 alc. (B. M.).

COSTA RICA: Cartago, 2,000 meters, 1 skin (B. M.); Rio Frio, 4 alc. (U.S.N.M.); Sipurio, 69 alc. (U.S.N.M.); Zent, 2 alc. (U.S.N.M.), 1 alc. (M. C. Z.); no exact locality, 1 skin (A. M. N. H.).

ECUADOR: Ambiyacu River, 1 alc. (A. N. S. P.); Bahia de Caraquez, Rio Briseño, 2 skins (A. M. N. H.); Bucay, 5 skins (A. M. N. H.); Cachabi, 1 skin, 5 alc. (B. M.); Canelos, 6 skins (A. M. N. H.); Casanga, Prov. del Oro, 1 skin (A. M. N. H.); Cuaque, El Destino, 2 skins (A. M. N. H.); Curaray River (Mouth of), 5 skins (A. M. N. H.); Daule, 2 skins (A. M. N. H.); Esmeraldas, 3 skins, including type of *esmeraldæ* (A. M. N. H.); Gualaquiza, 4 skins (B. M.); Manavi, 1 skin (A. M. N. H.); Mindo, 9 skins (B. M.); Naranjo, 1 skin (A. M. N. H.); Pambilar, 4 skins (U.S.N.M.); Paramba, 2 alc. (U.S.N.M.); Pto. Indiana, R. Amazonas, 1 skin (A. M. N. H.); Puente de Chimbo, 4 skins (A. M. N. H.); Puna Island, 2 skins (B. M.), 2 skins, including type of *punensis* (A. M. N. H.); San Emilio, 1 skin (B. M.); San Javier, 4 skins (U.S.N.M.); San Juan, 15 miles west of Juigra, 1 skin (B. M.); San Ramon, 1 skin (A. M. N. H.); Santiago River, 2 alc. (U.S.N.M.); Sarayacu, 6 skins (A. M. N. H.); Suno River, Oriente Province, 11 skins (A. M. N. H.); Ventura, 14 skins (A. M. N. H.); Zamora, 1 skin (A. M. N. H.); Zaruma, 1 skin (B. M.); Zaruma, Loja Trail, 1 skin (A. M. N. H.); no exact locality, 1 alc. (B. M.).

GRENADA, B. W. I.: 1 alc. (M. C. Z.).

GUATEMALA: Carolina, 4 skins (A. M. N. H.); El Cipres, 1 skin (A. M. N. H.). Both of these localities are near the Volcan Zuñil.

PANAMA: Boca de Cupe, 1 skin (U.S.N.M.); Bogaba, 1 alc. (M. C. Z.); Bohio, 1 skin, 3 alc. (U.S.N.M.); Boqueron, 2 skins (A. M. N. H.); Cana, 1 alc. (U.S.N.M.); Chepigana, 1 skin (A. M. N. H.); Chiriqui, 3 skins, including type of *chiriquensis* (A. M. N. H.), 1 alc. (U.S.N.M.); Cituro, 1 skin (A. M. N. H.); El Real, 3 skins (A. M. N. H.); Culebra, 2 alc. (U.S.N.M.); Gatun, 1 skin, 1 alc. (U.S.N.M.), 1 skin (A. M. N. H.); La Chorrera, 1 skin (A. M. N. H.); Obispo, 1 alc. (M. C. Z.); San

Pablo, 1 skin (U.S.N.M.), 1 alc. (M. C. Z.); Tabernilla, 1 skin, 3 alc. (U.S.N.M.); Taboga Id., 1 alc. (U.S.N.M.); Tacarcuna, 2 skins (A. M. N. H.); Tapalisa, 3 skins (A. M. N. H.).

PARAGUAY: Asuncion, 3 skins (U.S.N.M.); Paraguari, 7 skins (U.S.N.M.), 4 skins (B. M.), 1 skin (U. C.); Puerto Pinasco, 1 skin (U.S.N.M.); Sapucay, 6 skins, 14 alc. (U.S.N.M.), 6 skins, 2 alc. (B. M.); Villa Rica, 3 skins, 9 alc. (U.S.N.M.), 4 skins (B. M.).

PERU: Bellavista, 3 alc. (M. C. Z.); Cayana, 1 alc. (B. M.); Chanchamaya, 4 skins (B. M.), 1 skin (M. C. Z.); Cuzo, 4 skins (B. M.); Hacienda Limon, near Balsas, Maranon River, 1 skin (F. M.); Inca Mines, 4 skins, including type of *keaysi* (A. M. N. H.); Junin, 2 alc. (B. M.); Masisea, 1 skin (B. M.); Moyobamba, 3 skins, 2 alc. (F. M.); Perene, 2 skins (B. M.); Rio Ucayali, Masisea, 8 skins (B. M.); San Ignacio, 16 skins (A. M. N. H.); Santa Ana, 2 alc. (B. M.), 7 alc. (U.S.N.M.); Yurimaguas, 1 alc. (F. M.).

SAN SALVADOR: 2 alc., cotypes of *concinnus* (A. N. S. P.).

TOBAGO, B. W. I.: Court House, 1 skin (B. M.); Waterloo, 1 skin (B. M.), 1 alc. (A. N. S. P.).

TRINIDAD: Botanic Gardens, 2 alc. (B. M.).

VENEZUELA: Caicara, 1 skin (B. M.); Carabobo, 1 skin (B. M.); Caracas, 1 alc. (B. M.); Maipures, Rio Orinoco, 7 skins (B. M.); Maripa, 37 skins, including type of *maripensis* (A. M. N. H.); Merida, Montes del Escorial, 2500 meters, 1 skin, imm. (M. C. Z.); Merida, Montes de la Sierra, 1500–2000 meters, 3 skins (B. M.); Puerto Cabello, 2 alc. (B. M.); Rio Aurare, 1 skin (F. M.); San Esteban, 10 skins (B. M.), 10 alc. (U.S.N.M.); Tachira, 1 skin (F. M.); Valencia, 1 skin (A. M. N. H.); no exact locality, 1 alc. (B. M.).

Remarks.—It is with some hesitation that we have placed in the synonymy of *Myotis nigricans nigricans* the five names published by J. A. Allen on July 9, 1914. That all were based on representatives of this species there appears to be no doubt; but it is quite possible that some of them may eventually be shown to be applicable to local races. Such races, however, we have been unable to define on the basis of the material which we have seen.

MYOTIS NIGRICANS EXTREMUS, new subspecies

Myotis nigricans Miller, North Amer. Fauna, No. 13, p. 74, October 16, 1897 (part, specimens).—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 30, p. 257, December 27, 1901 (part).—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 476, 1904 (part).—Trouessart, Catal. Mamm. viv. foss., suppl., p. 93, 1904 (part).—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 475, 1905 (part).

Vespertilio concinnus Miller, Proc. Biol. Soc. Washington, vol. 13, p. 154, June 13, 1900 (part; not *Vespertilio concinnus* H. Allen).

Myotis nigricans concinnus Miller, List North Amer. Land Mamm. 1911, Bull U. S. Nat. Mus., No. 79, p. 58, December 31, 1912 (part); List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 72, April 29, 1924 (part).

Type locality.—Huehuetan, Chiapas, Mexico. Altitude, 300 feet.

Type specimen.—Adult female (skin and skull), No. 77670 United States National Museum (Biological Survey collection). Collected at Huehuetan, Chiapas, Mexico, March 1, 1896, by E. W. Nelson and E. A. Goldman. Original number 9455.

Distribution.—Tropical zone in southern Mexico (Chiapas, Campeche and Yucatan).

Diagnosis.—Size constantly below the maximum for the species; greatest length of skull usually less than 13.5 mm. and never attaining as much as 14 mm. (known maximum 13.4 mm.); foot usually more than half as long as tibia (average ratio of foot to tibia in 10 examples about 53.5).

Measurements.—For measurements see tables, pages 185 and 188.

Specimens examined.—Forty-one, from the following localities:

CAMPECHE: La Tuxpana, 1 skin (U.S.N.M.).
CHIAPAS: Huehuetan, 10 skins, 26 alc. (U.S.N.M.).
YUCATAN: Izamal, 2 skins (U.S.N.M.), 1 skin (A. M. N. H.); no exact locality. 1 skin (B. M.).

Remarks.—Superficially this small race of *Myotis nigricans* resembles the Mexican form of *M. californicus* in dark immature pelage. Specimens may be recognized, however, by the slight extent of the dark under color on the back, the relatively large foot (more than half as long as tibia), and the small teeth.

MYOTIS NIGRICANS NESOPOLUS Miller

Myotis nesopolus Miller, Proc. Biol. Soc. Washington, vol. 13, p. 123, April 6, 1900.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 93, 1904.—Lyon and Osgood, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 272, January 28, 1909.

Myotis nespotus J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 384, July 9, 1914 (misprint).

Type locality.—Near Willemstad, Curaçao, Dutch West Indies.

Type specimen.—Adult male in alcohol, No. 101849, United States National Museum, collected near Willemstad, island of Curaçao, Dutch West Indies, November 4, 1899, by L. B. Smith.

Diagnosis.—Similar to *Myotis nigricans extremus*, color apparently less dark and foot apparently shorter, the ratio of its length to that of tibia about as in true *M. nigricans*.

Description.—Color above between raw umber and Prout's brown, the bases of the hairs just perceptibly darker. Below, ochraceous buff, the basal half of the hairs slaty black.

Measurements.—For measurements see tables, pages 186 and 188.

Specimens examined.—Total number 2, as follows:

CURAÇAO, D. W. I: Willemstad, 2 alc., including type (U.S.N.M.).

Remarks.—*Myotis nigricans nesopolus* is so similar to the small race occurring in southern Mexico that we are unable to give wholly satisfactory characters by which to distinguish it. We believe, however, that good material from Curaçao will eventually establish the distinctness of the two forms, and that in the present state of our knowledge the course which we have adopted in describing the Mexican animal as new is less unreasonable than it would be to apply the name *nesopolus* to both of these small races of *Myotis nigricans*, separated as they are geographically by Colombia, Panama, and Central America, an area inhabited by the large typical form.

MYOTIS NIGRICANS DOMINICENSIS Miller

Myotis dominicensis Miller, Proc. Biol. Soc. Washington, vol. 15, p. 243, December 16, 1902.—Miller and Rehn, Proc. Boston Soc. Nat. Hist., vol. 31, p. 121, August 27, 1903.—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 576, 1904.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 95, 1904.—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 475, 1905.—Lyon and Osgood, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 270, January 28, 1909.—Miller, List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 58, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 72, April 29, 1924.

Type locality.—Dominica, British West Indies.

Type specimen.—Adult male, in alcohol, No. 113564 United States National Museum, collected on the island of Dominica, British West Indies, July 20, 1901, by H. Selwyn Branch.

Distribution.—So far as known, this bat is found only on the island of Dominica, Lesser Antilles. The form occurring on Grenada, to the southward, is apparently true *Myotis nigricans.* Up to the present time no representatives of the species have been recorded from the intermediate islands, nor has any member of the genus *Myotis* been reported from any other part of the entire Antillean chain.

Diagnosis.—Like *Myotis nigricans extremus* but with smaller skull.

Description.—A topotype is cinnamon brown both above and beneath, the membranes blackish brown. Another, probably in a subadult pelage, is fuscous above; chin and belly cinnamon brown. throat fuscous.

Skull.—The skull attains the smallest size that is known in any American *Myotis* (pl. 1, p. 7, fig. 5). In form it is peculiar in the unusually reduced volume of the brain case.

Measurements.—For measurements see tables, pages 186 and 188.

Specimens examined.—Total number 36, from the following localities:

DOMINICA, B. W. I: 1 skin (B. M.), 1 skin (M. C. Z.); 29 alc., including type (U.S.N.M.); Basin Well, 5 alc. (B. M.).

Remarks.—This is a fairly well-marked island race distinguished by the small size of the skull and the globular form of the brain case.

External measurements of Myotis nigricans

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis nigricans nigricans													
Costa Rica:													
Rio Frio	52796	♀	45.0	37.0	14.8	6.6	35.6	5.2	33.2	31.8	11.4	10.0	7.4
Do	52797	♀	43.0	40.4	16.0	6.6	37.4	6.0	34.8	33.0	13.0	10.2	7.8
Do	52798	♀	42.8	37.6	15.4	6.2	35.6	5.0	33.0	30.2	12.2	11.0	8.0
Do	52799	♀	43.4	40.6	15.2	6.4	36.4	5.2	34.4	32.0	12.8	11.2	8.2
Sipurio	16136	♀	45.0	36.2	16.0	8.0	36.4	5.8	34.0	32.0	11.4	11.4	8.4
Do	62253	♀	45.8	43.2	16.0	7.8	36.0	5.6	33.4	31.6	13.0	10.6	8.0
Do	62254	♀	43.4	39.8	16.4	7.0	37.0	5.2	34.4	33.4	12.8	10.8	8.8
Do	62255	♀	42.0	36.0	15.6	6.6	36.0	5.2	34.2	32.6	12.8	10.2	8.0
Do	62256	♀	40.4	43.8	15.8	6.4	36.0	5.8	35.0	32.6	12.8	9.4	8.0
Do	62257	♀	41.4	41.0	16.0	7.2	36.2	4.8	34.6	34.0	13.0	10.2	7.4
Do	62258	♀	42.8	34.8	16.0	7.2	36.0	4.8	33.4	32.0	12.6	10.4	8.0
Do	62259	♀	43.6	38.0	15.6	7.6	36.8	6.2	34.4	32.2	12.0	10.0	8.0
Do	62260	♀	43.2	39.4	15.8	6.4	36.4	5.2	35.4	34.4	11.6	10.0	6.2
Do	62261	♀	45.2	39.0	15.4	6.6	36.2	5.0	33.6	32.0	13.6	10.4	7.2
Do	62262	♀	41.2	34.6	16.2	6.2	35.4	4.8	34.0	31.4	10.4	10.0	7.6
Do	62263	♀	43.8	43.0	15.8	7.8	37.0	4.8	34.0	32.6	12.8	10.8	7.4
Do	62264	♀	42.2	39.4	16.2	6.6	36.2	5.2	34.6	32.0	12.6	10.2	7.2
Do	62265	♀	41.6	42.2	15.2	7.2	35.4	5.0	34.0	32.2	14.0	12.0	8.0
Do	62266	♀	43.2	38.4	15.4	6.8	35.8	5.2	33.6	31.0	11.4	10.8	8.0
Do	62267	♀	41.6	46.0	15.0	7.0	35.4	5.0	33.2	31.8	12.4	10.2	7.0
Do	62269	♀	38.0	36.8	15.4	7.0	35.8	5.2	33.8	32.2	13.0	11.2	7.6
Do	62270	♂	46.2	37.4	15.8	6.8	36.0	5.4	34.0	32.4	12.4	11.2	8.4
Do	62271	♀	44.0	36.6	15.6	7.2	36.0	5.2	34.2	34.6	13.0	10.4	7.6
Do	62272	♀	42.0	37.4	16.0	7.2	36.4	5.0	34.8	33.4	11.6	11.0	7.4
Panama:													
Bohio	179719	♀	45.0	35.6	16.2	7.0	36.0	5.2	32.6	32.0	11.8	11.6	7.0
Do	179720	♀	42.0	35.6	15.8	6.6	35.8	5.4	33.0	31.0	12.2	11.2	7.2
Gatun	223311	♂	38.8	34.0	13.6	5.8	32.8	4.8	29.2	28.0	12.0	11.0	7.2
Taboga Island	175124	♂	38.2	34.8	15.4	6.8	35.0	5.0	32.0	31.0	12.2	10.0	8.4
Cana	179721	♂	39.8	34.2	15.4	6.6	35.2	5.4	33.4	31.2	11.6	11.6	7.0
Chiriqui	174979	♂	44.0	33.8	14.2	5.2	34.8	4.8	31.0	30.8	12.6	10.4	8.0
Do	[1] 18736 A.M.N.H.	♀	"43"	"30"	12.6	6.4	26+	5.6	31.6	30.0	----	----	----
Culebra	223312 U.S.N.M.	♂	40.2	33.0	14.0	5.8	34.0	5.0	32.0	29.8	12.6	11.0	7.2
Tabernilla	144501	♀	41.0	35.0	14.4	6.6	35.0	5.0	33.0	31.0	12.2	10.0	8.4
	144504	♂	43.2	32.2	15.2	6.0	34.4	5.0	32.0	31.0	12.0	11.2	7.6
Colombia:													
Valdivia	98.10.3 B.M.	♀	47.6	38.6	15.0	8.0	34.4	5.0	32.6	31.2	12.2	11.8	8.0
Do	98.10.3	♀	45.0	41.8	14.8	7.0	36.0	4.8	33.8	31.8	12.0	11.2	8.0
Do	98.10.3	♀	42.6	40.0	15.0	6.8	35.0	4.6	33.0	32.0	12.8	11.4	8.0
Do	98.10.3.31	♀	44.8	37.0	13.8	7.4	34.8	5.0	31.0	30.0	13.2	10.6	8.0
Bonda	[2] 14587 A.M.N.H.	----	----	----	14.0	7.0	32.6	6.4	30.4	29.0	----	----	----
Cauca River	[3] 32788	♂	"42"	"39"	15.0	7.0	37±	6.6	34.2	32.2	----	----	----
Venezuela:													
San Esteban	142568	♂	43.6	33.2	15.4	6.8	37.4	6.0	32.6	31.6	13.0	8.6	8.2
Do	142569	♂	45.2	36.4	15.0	7.0	38.6	6.2	34.0	32.2	13.2	11.0	8.8
Do	142570	♀	41.0	39.0	14.2	6.8	37.4	5.8	34.8	32.6	12.4	10.0	7.6
Do	142571	♀	42.6	38.0	15.2	7.0	38.2	6.2	34.2	32.4	13.4	10.2	9.2
Do	142575	♀	42.0	37.8	15.6	6.8	37.6	6.2	34.0	32.6	13.2	11.0	8.0
Do	142572	♂	39.2	35.0	14.0	6.2	32.6	5.0	31.8	30.2	12.6	10.8	8.0
Do	142573	♂	38.0	33.0	13.4	6.0	32.0	4.4	30.0	29.0	11.8	8.6	7.0
Do	142574	♂	40.2	35.4	13.2	6.6	32.4	5.0	30.2	29.4	12.0	9.2	7.2
Do	142576	♀	40.0	33.8	14.4	6.0	33.2	5.0	31.0	30.2	12.0	10.0	7.4
Do	142577	♀	38.8	37.0	14.8	6.4	34.2	5.0	32.0	30.4	12.0	11.0	7.4
Puerto Cabello	91.1.1.1 B.M.	♀	41.4	36.8	14.6	7.2	36.2	6.4	32.4	31.2	12.8	9.0	8.0
Do	91.1.1.2	♀	41.6	36.6	14.4	7.4	36.8	5.0	33.6	31.8	12.4	10.0	7.0
Maripa	[4] 17069 A. M. N. H.	♀	----	----	13.6	6.0	33.0	31.4	6.4	29.0	----	----	----
Trinidad	93.10.16.1 B.M.	♀	43.2	34.8	13.4	6.0	34.0	5.2	31.6	29.0	12.2	11.0	6.8
British Guiana:													
Upokarit, Kanuku Mountains	1.6.4.136	♀	40.4	37.8	14.6	6.4	35.0	5.4	32.0	29.8	13.0	10.4	7.4
Do	1.6.4.137	♀	42.4	39.0	14.4	6.6	35.6	5.8	33.0	32.0	13.4	11.0	8.0
Do	1.6.4.138	♀	43.0	34.2	15.0	7.0	35.0	5.0	32.4	31.0	13.4	11.0	8.2

[1] Type of *Myotis chiriquensis* J. A. Allen.

[2] Type of *Myotis bondæ* J. A. Allen.

[3] Type of *Myotis caucensis* J. A. Allen.

[4] Type of *Myotis maripensis* J. A. Allen.

External measurements of Myotis nigricans—Continued

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis nigricans nigricans—Con.													
Peru:													
Junin	0. 7. 7. 63 B.M.	♂	43.0	37.4	16.0	7.0	39.0	5.8	35.4	33.4	12.8	11.4	7.4
Do	0. 7. 7. 64	♂	47.0	37.0	15.0	7.0	35.4	5.2	33.4	31.0	12.0	10.8	7.8
Cayana	B. M.	♂	46.2	38.0	15.4	7.2	34.6	5.4	33.0	31.4	12.0	10.8	8.2
Moyobamba	19955 F. M.	♂	45.0	34.0	15.2	7.4	35.4	6.0	33.6	31.8	12.4	10.4	8.0
Do	19956 F. M.	♀	42.2	36.8	13.6	7.0	34.2	6.0	30.6	29.0	12.6	10.4	7.2
Santa Ana	97. 10. 3. 20 B. M.	♂	43.6	37.0	16.0	7.0	36.4	5.6	34.0	32.4	12.2	11.0	8.0
Do	97. 10. 3. 21. B. M.	♀	43.0	36.2	15.0	6.8	36.2	5.4	33.6	32.0	11.8	10.2	7.6
Inca Mines	[5] 15814 A. M. N. H.	♂	"49"	"40"	15.4	8.0	38.6	6.6	34.6	32.6	-----	-----	----
Bolivia:													
Balzan	0. 8. 3. 2 B. M.	♀	43.2	38.2	14.0	7.2	35.0	5.6	30.6	29.4	12.4	12.0	8.0
Do	0. 8. 3. 3	♀	42.8	41.6	15.4	7.6	36.0	5.8	32.8	30.4	12.0	10.8	7.8
Do	0. 8. 3. 4	♀	47.0	38.2	16.0	7.2	36.0	5.2	33.0	32.0	12.8	12.0	8.4
Do	0. 8. 3. 5	♀	44.4	37.6	15.0	7.2	35.2	6.0	33.8	33.0	13.0	11.2	8.0
Rosario	238682 U.S.N.M.	♀	41.8	34.8	13.8	7.0	32.0	5.4	30.0	29.0	12.0	10.4	7.0
Do	238683	♂	40.0	31.2	14.0	6.6	33.2	5.2	29.8	28.6	12.4	9.4	7.0
Do	238684	♀	43.4	37.4	14.8	6.4	35.2	5.2	31.8	30.8	13.0	10.4	8.2
Do	238685	♀	44.6	34.8	14.0	6.2	33.2	5.0	29.6	28.4	13.0	9.4	8.2
Santa Cruz Province	21 B. M.	♀	41.2	39.2	15.0	6.6	35.0	4.6	32.2	30.8	12.2	11.6	8.6
Do	28	♂	45.0	34.4	15.0	7.0	34.4	6.0	32.0	31.2	11.4	9.4	8.0
Do	29	♂	43.2	32.0	14.2	7.8	33.2	6.0	31.0	30.0	12.2	10.2	7.0
Do	33	♂	43.4	31.8	14.4	6.2	32.2	6.0	30.6	29.6	12.0	11.0	7.6
Do	35	♀	45.0	35.6	15.0	6.6	34.8	5.4	32.6	31.6	11.4	9.8	6.8
Do	25	♀	47.0	37.8	15.4	6.6	36.0	6.0	32.4	31.8	13.0	11.2	8.0
Do	27	♂	44.6	35.0	15.0	7.0	35.0	5.4	32.0	30.6	12.0	11.2	7.6
Ecuador:													
Cachabi	97. 11. 7. 63 B. M.	♂	44.4	37.2	15.8	6.8	35.6	5.0	31.6	30.6	13.0	10.4	7.0
Do	97. 11. 7. 66	♀	43.6	34.8	13.4	6.8	34.0	5.2	31.2	30.0	12.4	11.2	7.2
Do	97. 11. 7. 67	♀	44.0	37.2	15.0	6.0	35.8	5.0	34.0	31.2	13.2	12.2	7.2
Do	[6] 33239 A.M.N.H.	♂	-----	-----	15.0	6.6	34±	6.0	33.0	30.4	-----	-----	----
Santiago River	22453	♀	43.2	36.2	14.2	6.0	34.0	5.0	30.8	29.4	12.0	11.0	7.4
Paramba	113348 U. S. N. M.	♂	41.6	33.2	14.6	6.0	34.4	4.8	33.0	31.8	12.0	10.0	7.2
Do	113349	♀	40.0	36.0	14.8	6.8	35.6	4.4	33.2	31.4	11.0	9.8	7.2
Brazil:													
Palmeiras	0. 6. 29. 25 B.M.	♂	39.8	33.0	12.8	6.2	34.0	5.4	30.6	29.4	11.0	9.8	6.8
Do	0. 6. 29. 25	♂	40.0	35.2	13.6	6.4	33.8	4.4	32.2	30.8	12.8	10.4	7.4
San Lorenzo	88. 11. 30. 3	♂	41.0	39.0	14.2	6.8	35.2	5.2	32.2	31.8	12.6	10.0	7.2
Do	88. 11. 30. 4	♀	40.2	36.0	14.8	7.2	36.2	5.4	33.0	30.8	11.2	10.4	7.0
Para	1. 7. 11. 3	♂	44.0	35.0	15.0	6.8	36.2	5.6	31.8	31.0	12.2	11.0	7.4
Rio Janeiro	92. 11. 24. 10	♂	41.2	34.0	14.6	6.4	34.2	4.8	31.2	30.4	11.6	11.4	7.0
Do	92. 11. 24. 11	♀	44.4	37.4	14.8	6.4	35.8	5.0	33.2	31.0	12.6	10.4	7.2
Interior	14689 U.S.N.M.	♀	41.8	36.4	14.6	7.0	36.0	5.0	33.2	31.2	12.4	9.8	7.4
Paraguay:													
Sapucay	115085	♂	41.4	37.8	14.6	7.0	33.0	5.4	31.0	30.0	13.6	11.4	7.8
Do	115086	♀	44.0	35.2	14.8	6.4	35.0	5.2	33.0	30.8	12.8	11.0	8.0
Do	115087	♀	44.4	35.0	14.6	6.6	34.4	5.2	31.0	30.2	12.8	11.8	7.8
Do	115088	♂	43.4	37.2	14.8	7.0	36.0	5.4	32.6	31.8	12.8	10.6	8.0
Do	115089	♂	43.0	36.0	15.0	6.4	35.0	5.4	32.0	30.0	12.4	11.0	8.4
Do	115090	♀	41.8	37.2	14.0	6.0	34.6	4.4	32.8	31.8	12.6	10.0	6.8
Do	115094	♂	45.6	35.0	14.2	5.0	34.8	4.8	33.4	32.0	12.0	10.4	8.0
Do	115095	♂	49.0	36.4	14.6	7.0	35.8	5.0	33.0	32.4	12.8	10.4	7.0
Do	121476	♂	40.4	35.0	13.6	7.2	32.6	5.4	29.8	28.2	12.8	10.8	7.8
Do	121477	♂	44.4	33.6	14.6	6.8	35.0	5.2	32.2	31.2	11.4	10.6	7.4
Do	2. 4. 7. 50 B.M.	♀	40.6	41.6	14.0	6.2	34.6	5.0	32.2	31.8	11.0	10.0	6.6
Do	2. 4. 7. 52 B.M.	♀	43.0	37.0	13.8	6.0	35.2	5.0	33.0	32.2	11.6	10.0	7.4
Myotis nigricans extremus													
Mexico:													
Huehuetan, Chiapas	77533 U.S.N.M.	♀	39.2	35.8	14.4	8.0	38.0	6.0	34.0	32.0	13.0	10.0	7.8
Do	77534	♀	43.0	37.4	13.8	8.8	37.0	6.0	33.0	31.4	13.4	9.8	8.0
Do	77535	♀	39.8	36.0	14.0	7.4	35.6	6.0	33.0	31.0	12.8	9.8	8.0
Do	77536	♀	41.2	32.4	13.6	7.8	36.4	6.2	32.8	31.2	12.2	9.4	7.6
Do	77537	♀	40.0	35.0	14.4	7.2	36.0	5.8	32.4	30.0	12.0	10.0	8.0
Do	77538	♀	42.0	37.2	14.0	8.4	36.6	6.2	33.2	32.0	13.4	9.8	7.6

[5] Type of *Myotis ruber keaysi* J. A. Allen.

[6] Type of *Myotis esmeraldæ* J. A. Allen.

External measurements of Myotis nigricans—Continued

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis nigricans extremus—Continued													
Mexico—Continued.													
Huehuetan, Chiapas	77539	♀	40.0	34.6	14.2	6.6	34.2	5.8	31.6	30.8	12.4	9.4	7.8
Do	77540	♀	39.2	33.2	14.0	6.6	33.8	5.6	32.0	30.6	12.8	10.0	7.4
Do	77541	♀	40.8	38.2	14.6	7.8	36.4	6.0	33.6	32.0	12.4	11.0	8.8
Do	77542	♀	40.0	36.0	13.6	6.8	34.4	4.6	31.8	31.0	12.6	10.6	7.0
Do	77543	♀	41.2	36.2	13.4	7.2	35.0	5.0	32.0	30.8	12.4	9.6	8.4
Do	77544	♀	40.0	35.0	13.2	6.8	34.0	4.6	31.2	30.4	13.0	10.4	7.8
Do	77545	♀	38.0	33.6	14.0	6.6	33.4	4.2	31.0	30.2	12.0	9.8	7.6
Do	77546	♀	39.0	33.2	13.0	7.4	34.4	4.0	30.2	29.0	10.2	9.8	7.0
Do	77547	♀	38.6	38.0	14.4	6.0	33.6	5.0	31.4	30.0	12.2	11.0	7.8
Do	77548	♀	40.0	34.4	12.6	7.6	32.4	5.2	30.4	30.0	12.6	9.2	8.0
Do	77549	♀	42.0	36.4	14.0	6.6	33.4	4.6	31.0	30.4	12.8	9.6	8.2
Do	77550	♀	38.8	35.8	14.0	7.6	33.2	4.2	31.0	30.6	12.0	11.0	7.4
Do	77551	♀	41.0	35.0	13.8	6.6	33.6	4.6	31.2	30.0	12.6	9.2	8.0
Do	77552	♀	41.2	35.8	14.2	6.4	33.4	5.2	30.8	29.8	12.4	9.2	7.2
Do	77553	♀	40.0	36.0	15.0	7.2	35.0	5.0	33.0	31.0	12.0	9.4	8.4
Do	77554	♀	42.0	36.0	14.4	6.4	34.0	5.0	31.8	30.8	12.4	10.0	8.0
Do	77555	♀	39.8	32.6	14.4	6.6	34.0	4.2	31.8	30.2	12.6	10.2	8.0
Do	77556	♀	40.2	32.8	14.2	6.4	33.4	5.0	30.4	29.6	12.4	9.2	7.8
Do	77557	♀	42.0	33.4	14.4	7.4	34.6	4.4	32.0	31.0	13.0	10.0	8.0
Do	77558	♀	41.0	33.0	14.2	6.0	33.0	4.8	31.2	30.0	12.6	10.6	7.2
Do	[7] 77670	♀	"47"	"35"	15.4	7.0	34.0	5.6	31.2	30.4	----	----	----
Do	205150	♀	40.4	33.8	13.6	7.4	34.6	5.0	31.6	31.0	11.8	11.2	7.2
Yucatan	172073	♂	40.2	30.0	13.8	7.0	33.8	----	31.0	28.8	----	----	----
Do	172706	♂	40.0	28.4	13.0	6.6	31.8	----	28.4	27.4	----	----	----
Do	94.2.5.1 B. M.	----	41.0	----	14.2	6.4	32.4	----	28.6	27.2	----	----	----
Myotis nigricans dominicensis													
British West Indies:													
Dominica	113557	♂	37.6	32.0	12.0	6.8	33.4	5.2	29.4	28.0	12.2	11.0	6.8
Do	113558	♂	39.2	34.8	13.0	7.0	33.6	5.2	30.4	29.0	11.2	9.8	7.4
Do	113559	♀	35.4	36.0	12.6	6.8	35.2	6.0	30.6	29.2	13.0	10.0	7.2
Do	113560	♀	38.0	35.4	12.8	7.8	34.2	5.6	30.0	29.4	12.2	10.8	7.2
Do	113561	♂	38.0	33.2	13.0	7.0	35.0	5.4	30.0	28.6	13.2	10.6	7.4
Do	113562	♀	39.8	35.0	12.6	6.4	35.0	5.6	31.6	30.2	13.0	10.4	7.2
Do	113563	♀	40.0	35.0	13.0	7.2	34.4	6.0	30.2	29.6	12.8	11.2	7.8
Do	[7] 113564	♂	38.0	29.0	12.4	6.8	33.8	5.8	29.0	28.2	11.4	8.4	6.8
Do	113565	♀	38.2	38.6	12.8	6.8	35.4	5.6	31.8	30.0	12.2	10.0	7.8
Do	113566	♀	36.6	35.8	13.0	6.6	35.6	6.0	31.6	30.4	11.4	9.4	7.6
Do	113567	♂	39.0	36.0	12.4	7.0	34.0	6.4	31.2	30.0	12.0	11.0	7.4
Do	92.9.8. Dupl. B.M.	♂	36.0	36.0	12.4	6.4	34.0	5.2	29.8	28.6	13.0	10.6	7.2
Do	92.9.8 Dupl.	♀	39.4	34.6	13.0	7.2	35.2	5.2	30.0	28.8	11.8	10.4	7.0
Do	92.9.8.3	♂	35.0	33.4	12.2	6.6	33.6	6.0	28.4	26.8	12.0	10.4	7.6
Do	92.9.8.5	♀	38.0	36.8	13.0	6.8	34.0	5.2	29.8	28.6	11.2	10.8	7.8
Myotis nigricans nesopolus													
Curaçao, D. W. I.:													
Willemstad	105128	♀	41.8	36.0	15.0	6.0	31.6	4.0	30.0	29.2	11.0	9.6	8.2

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[7] Type.

Cranial measurements of Myotis nigricans

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis nigricans nigricans													
Costa Rica:													
Cartago	98. 10. 9. 1 B. M.	♂	14.0	13.1	----	3.7	6.7	5.1	10.0	5.2	5.5	5.7	0
Sipurio	62270	♂	14.2	13.0	----	3.6	7.0	5.2	9.6	5.2	5.5	5.6	0
Do	62279	♂	14.2	13.2	----	3.2	6.6	5.0	10.2	5.4	5.5	5.8	0
Do	62282	♂	14.1	13.2	----	3.2	6.6	5.0	10.0	5.2	5.7	5.6	1
Do	62253	♀	14.1	13.2	----	3.2	6.6	5.0	10.0	5.2	5.5	5.8	1
Do	62255	♀	14.3	13.0	----	3.0	6.8	5.0	10.0	5.2	5.4	5.6	0
Do	62259	♀	14.2	13.2	8.4	3.2	6.6	5.0	9.8	5.2	5.5	5.6	1
Do	62283	♀	-----	13.0	----	3.0	6.8	5.0	9.6	5.0	5.6	5.4	1
San Salvador	[1] 1114 A. N. S. P.	♀	13.9	13.2	8.4	3.2	6.5	4.9	10.0	5.3	5.6	5.7	0
Do	1115	♀	14.0	13.1	----	3.4	6.7	5.0	10.0	5.2	5.7	5.6	0
Panama:													
Chiriqui	174979	♂	13.6	13.0	8.0	3.2	6.6	4.8	9.4	5.0	5.3	5.4	0
Taboga Island	175124	♂	14.0	13.0	8.0	3.4	6.6	4.8	9.6	5.0	5.2	5.4	0
Chiriqui	18735 A.M.N.H.	♂	13.5	12.8	----	3.1	6.6	4.8	10.2	5.2	5.6	5.6	2
Do	[2] 18736	♀	13.7	12.7	----	3.5	6.5	4.9	9.4	5.0	5.6	5.4	0
San Pablo	6763 M. C. Z.	♂	14.7	13.6	9.0	4.0	7.2	5.8	10.6	5.2	5.6	5.8	1
Colombia:													
Bonda	[3] 14587 A.M.N.H.	----	13.2	12.4	8.0	3.0	6.5	4.6	9.4	5.0	5.2	5.2	2
Do	15143	♀	13.3	12.4	----	3.1	6.3	4.8	9.5	5.0	5.1	5.5	2
Buenavista	34239 A.M.N.H.	♀	13.1	12.3	----	3.1	6.4	5.0	9.6	4.9	5.3	5.3	0
Do	34240 A.M.N.H.	♂	13.5	12.8	8.3	3.2	6.6	4.8	9.8	5.1	5.5	5.5	0
Choco	14. 5. 28. 3 B. M.	♀	13.2	12.6	8.0	3.4	6.6	5.0	9.6	5.0	5.4	5.4	0
Do	14. 5. 28. 32	♀	14.7	13.7	9.0	4.0	7.4	5.6	11.0	5.3	5.8	6.0	1
Do	19467 M. C. Z.	♂	14.5	13.6	8.8	4.0	7.0	5.2	10.5	5.1	5.6	5.4	0
Rio Frio, Cauca	[4] 32787 A.M.N.H.	♂	14.0	13.4	8.6	3.6	6.9	4.9	10.4	5.4	5.8	5.7	2
Venezuela:													
Maripa	17050 A.M.N.H.	♂	13.4	12.3	----	3.0	6.1	4.5	9.3	5.0	5.1	5.1	1
Do	17051	♂	13.8	12.9	8.3	3.2	6.7	4.8	9.7	5.1	5.5	5.6	2
Do	17072	♂	13.5	12.8	----	3.1	6.3	4.9	9.6	5.0	5.4	5.2	2
Do	17087	♂	13.0	12.0	----	3.2	6.4	4.8	9.2	4.7	5.3	5.1	0
Do	17065	♀	13.2	12.4	----	3.1	6.4	4.6	9.4	5.0	5.1	5.0	0
Do	17066	♀	13.6	12.6	----	3.3	6.4	4.6	9.6	5.0	5.5	5.2	2
Do	[5] 17069	♀	13.5	12.6	8.2	3.1	6.5	4.6	9.5	5.0	5.3	5.2	1
Do	17079	♀	13.7	12.5	----	3.3	6.7	4.6	9.8	5.1	5.3	5.3	0
Do	17081	♀	13.4	12.6	----	3.3	6.4	4.8	9.5	5.0	5.3	5.1	1
Do	17086	♀	13.2	12.4	----	3.2	6.6	4.6	9.6	5.0	5.5	5.1	1
San Esteban	142568 U.S.N.M.	♂	13.6	12.8	8.8	3.4	6.6	5.0	10.0	5.2	5.4	5.4	1
Do	142572	♂	12.8	12.0	----	3.4	6.6	4.6	9.0	4.8	5.0	5.0	2
Do	142574	♂	12.8	12.0	8.0	3.2	6.4	4.8	9.0	4.8	5.2	5.0	2
Do	142569	♀	13.4	12.8	8.6	3.4	6.6	5.0	9.8	5.2	5.4	5.6	1
Do	142576	♀	13.2	12.2	----	3.2	6.4	4.6	9.2	4.8	5.2	5.0	1
British West Indies:													
Grenada	14600 M.C.Z.	♂	13.5	13.0	8.5	3.4	6.8	4.8	9.8	5.0	5.4	5.4	1
Tobago	97. 6. 7. 33 B. M.	♂	-----	12.2	----	3.6	7.0	----	9.3	5.0	5.1	5.1	0
Do	97. 6. 7. 34 B. M.	♂	13.3	12.2	8.4	3.5	6.4	5.0	9.5	5.0	5.2	5.1	2
Ecuador:													
Esmeraldas	[6] 33239 A.M.N.H.	♂	13.2	12.2	8.4	3.2	6.5	4.9	10.0	5.0	5.2	5.5	1
Do	33240	----	13.5	12.9	----	3.5	6.8	5.1	9.9	5.1	5.6	5.4	1
San Javier	133343	♂	13.7	12.6	8.0	3.2	6.4	4.8	9.6	5.0	5.2	5.2	0
Do	133344	♂	13.2	12.0	----	3.2	6.2	4.8	9.2	5.0	5.1	5.2	0
Do	133340	♀	13.5	12.0	8.0	3.0	6.6	4.8	9.0	5.0	5.4	5.2	0
Do	133341	♀	13.5	12.2	8.0	3.2	6.2	4.4	9.0	5.0	5.4	5.2	0
Do	133345	♀	13.8	12.4	8.0	3.2	6.6	4.8	9.4	5.0	5.3	5.2	0
Do	133346	♀	13.7	12.8	8.0	3.2	6.8	4.6	9.2	4.8	----	5.2	0
Do	133347	♀	13.5	12.2	8.0	3.0	6.4	4.6	9.2	5.0	5.5	5.2	0
Daule	36258 A.M.N.H.	♀	-----	12.4	----	3.0	6.6	----	9.0	5.0	5.6	5.2	0
Do	36259	----	13.2	12.4	8.4	3.0	6.8	5.0	9.2	5.0	5.4	5.2	2
Puna Island	[7] 36263	♂	13.2	12.2	8.2	3.2	6.6	5.0	9.2	5.0	5.2	5.2	0
Peru:													
Inca Mines	[8] 15814 A.M.N.H.	♂	-----	-----	----	3.4	6.5	----	10.4	5.2	5.4	5.6	0
Do	16073	♀	14.2	13.8	----	3.3	6.7	5.2	10.7	5.5	5.8	5.9	2
Do	16563	♂	14.1	13.3	----	3.6	7.0	5.3	10.4	5.5	5.7	5.9	2
Do	16564	----	14.4	13.5	----	3.6	7.0	5.2	11.0	5.5	6.0	5.8	2
Junin	0.7.7.3 B.M.	♂	14.0	13.5	8.9	4.0	7.2	5.4	10.7	5.4	5.9	5.8	0
Cuzco	98.11.6.5	♂	14.0	13.5	9.1	3.6	7.1	5.4	10.7	5.3	5.7	5.7	1
Do	98.11.6.4	♂	13.8	13.4	8.5	3.6	7.0	5.0	10.7	5.5	5.5	5.7	1
Do	98.11.6.3	♂	14.0	13.3	----	3.4	7.0	5.4	10.6	5.3	6.0	5.8	0
Moyobamba	19218 FM.	♂	14.0	13.1	8.5	3.4	6.7	4.9	10.0	5.2	5.5	5.5	1
Do	19219	♀	14.2	13.0	8.6	3.5	6.7	4.9	10.0	5.1	5.6	5.5	1
Masisea	138 (orig.) B.M.	♂	13.6	13.0	----	3.5	6.7	5.1	10.0	5.1	5.5	5.5	0

[1] Cotypes of *Vespertilio concinnus* H. Allen.

[2] Type of *Myotis chiriquensis* J. A. Allen.

[3] Type of *Myotis bondæ* J. A. Allen.

[4] Type of *Myotis caucensis* J. A. Allen.

[5] Type of *Myotis maripensis* J. A. Allen.

[6] Type of *Myotis esmeraldæ* J. A. Allen.

[7] Type of *Myotis punensis* J. A. Allen.

[8] Type of *Myotis ruber keaysi* J. A. Allen.

Cranial measurements of Myotis nigricans—Continued

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis nigricans nigricans—Continued													
Brazil:													
São Sebastião	141394 U.S.N.M.	♂	13+	12.0	8.0	3.2	6.6	5.0	9.2	5.0	5.4	5.2	2
Do	141397	♂	13.6	12.2	8.0	3.4	6.6	4.8	9.2	5.2	5.4	5.2	1
Do	141409	♂	13.4	12.5	8.4	3.6	6.8	5.0	9.4	5.0	5.3	5.1	1
Do	141421	♂	13.4	12.6	8.2	3.4	6.4	4.6	9.2	4.8	5.4	5.0	1
Do	141395	♀	13.5	12.4	8.2	3.4	6.4	4.8	9.6	5.0	5.3	5.2	1
Do	141396	♀	13.9	13.0	8.2	3.4	6.6	4.8	9.6	5.0	5.5	5.2	0
Do	141415	♀	13.3	12.6	8.0	3.4	6.6	4.8	9.2	5.0	5.5	5.2	2
Do	141418	♀	13.5	12.2	----	3.4	6.4	4.8	9.0	5.0	5.1	5.2	2
Do	141423	♀	13.5	12.4	----	3.2	6.6	4.8	9.0	5.0	5.5	5.2	1
Do	141425	♀	13.4	12.2	----	3.4	6.4	4.8	9.0	4.8	5.3	5.0	1
Do	141430	♀	13.6	12.6	8.2	3.2	6.6	4.8	9.0	4.8	5.3	5.0	1
Do	141435	♀	13.6	12.2	8.2	3.4	6.4	5.0	9.0	5.0	5.2	5.2	1
Do	141438	♀	13.3	12.4	8.2	3.4	6.4	4.8	9.2	4.8	5.5	5.0	1
Bahia	3.9.5.19 B.M.	♀	14.5	13.6	----	3.2	6.8	5.0	10.5	5.3	5.7	5.7	1
Do	3.9.5.20	♀	13.9	12.9	----	3.2	6.7	----	10.0	5.4	5.4	5.5	1
Do	3.9.5.21	♀	14.3	13.2	8.4	3.1	6.8	4.8	10.5	5.2	5.4	5.7	1
Do	3.9.5.22	♀	14.0	13.4	8.4	3.4	6.8	5.0	10.3	5.3	5.6	5.6	1
Near Para	11.12.22.4	----	13.5	12.5	8.2	3.2	6.4	4.8	9.6	5.0	5.4	5.3	1
Paraguay:													
Villa Rica	115069 U.S.N.M.	♂	13.4	12.4	----	3.4	6.4	5.0	9.0	5.0	5.3	5.2	0
Asuncion	115070	♂	13.4	12.2	8.0	3.2	6.4	4.8	9.0	5.0	5.2	5.2	1
Sapucay	115071	♂	13.6	12.6	8.6	3.2	6.8	5.0	9.6	5.0	5.4	5.2	0
Do	115072	♂	13.8	13.0	----	3.2	6.6	4.8	10.0	5.2	5.5	5.4	0
Do	105621	♂	13.3	12.0	----	3.2	6.6	4.8	9.0	5.0	5.3	5.2	0
Paraguari	115076	♂	13.6	12.6	----	3.4	6.8	4.8	9.2	5.0	5.5	5.2	0
Do	115079	♂	13.3	12.0	----	3.4	6.4	5.0	9.0	5.0	5.2	5.2	1
Villa Rica	104931	♀	13.8	13.0	----	3.4	6.6	4.8	9.8	5.0	5.4	5.4	1
Do	104932	♀	13.2	12.6	----	3.2	6.4	5.0	9.6	5.0	5.4	5.2	1
Do	104933	♀	13.4	12.8	8.2	3.4	6.6	4.8	9.6	5.0	----	5.4	0
Sapucay	115073	♀	13.6	13.0	----	3.4	6.6	5.0	10.0	5.2	5.8	5.4	0
Do	115074	♀	13.4	12.2	----	3.2	6.4	5.0	9.2	5.0	5.4	5.2	0
Paraguari	115075	♀	13.7	12.8	----	3.4	----	5.0	9.6	5.0	----	5.4	3
Do	115077	♀	13.5	12.6	8.2	3.4	6.6	5.0	9.0	5.0	5.4	5.2	0
Do	115078	♀	13.6	12.8	8.6	3.6	6.8	4.8	9.6	5.2	5.6	5.4	3
Do	115080	♀	14.0	13.2	----	3.6	6.8	5.0	9.8	5.2	5.5	5.4	2
Do	115081	♀	14.0	13.0	----	3.8	6.6	5.0	10.0	5.0	5.5	5.4	3
Myotis nigricans extremus													
Campeche	170859	♀	13.3	12.2	7.8	3.0	6.0	5.0	9.0	5.0	5.2	5.2	0
Chiapas:													
Huehuetan	[1] 77670	♀	13.2	12.2	8.0	3.2	6.4	4.8	9.0	4.8	5.2	5.0	1
Do	77671	♀	12.8	12.0	7.8	3.2	6.2	4.8	9.0	5.0	5.3	5.2	0
Do	77672	♀	13.4	12.2	----	3.2	----	----	9.0	4.8	5.2	5.0	0
Do	77674	♀	13.0	11.8	----	3.2	6.2	----	9.0	4.8	5.1	5.0	0
Do	77675	♀	13.2	12.2	----	3.0	----	----	9.2	4.8	5.3	5.0	0
Do	77678	♀	13.2	12.0	8.0	3.2	6.4	5.0	9.0	4.8	5.2	5.0	0
Yucatan:													
Izamal	172073	♂	13.2	12.0	----	3.0	6.2	4.8	9.0	4.8	4.9	5.2	0
Do	172706	♂	13.0	12.0	----	3.0	5.8	4.4	8.8	4.8	4.7	5.0	0
Myotis nigricans dominicensis													
British West Indies:													
Dominica	[1] 113564	♂	12.6	11.9	7.3	3.0	6.3	4.3	9.0	4.9	4.8	5.0	0
Do	17840 M.C.Z.	----	13.1	12.5	----	3.0	6.1	4.6	9.5	5.0	5.0	5.3	1
Do	113547 U.S.N.M.	♂	13.0	12.1	----	3.2	6.2	4.7	9.3	4.8	5.1	5.1	0
Do	113555	♀	12.8	12.2	7.8	3.1	6.2	4.5	9.7	4.9	5.0	5.1	0
Do	113563	♀	13.2	12.5	----	3.2	6.5	4.9	9.8	5.1	5.1	5.3	1
Myotis nigricans nesopolus													
Curaçao:													
Willemstad	[1] 101849	♂	13.4	12.5	7.8	3.0	6.3	4.7	9.4	5.0	5.0	5.3	1
Do	105128	----	13.6	13.0	8.0	3.4	6.6	5.0	9.8	5.1	5.1	5.5	1

[1] Type.

MYOTIS CHILOËNSIS (Waterhouse)

(Synonymy under subspecies)

Distribution.—South America from northern Ecuador to southern Chile; eastward to the coast of Argentina.

Diagnosis.—Like *Myotis nigricans* but larger (forearm 35 to 43.4 mm., usually more than 37 mm.); greatest length of skull 14.2 to 16.2 mm., usually more than 14.5; maxillary tooth row 5.4 to 6.3 mm., usually more than 5.5 mm.; mandibular tooth row 5.5 to 6.5 mm., usually more than 5.8 mm.; ear longer, extending distinctly beyond tip of muzzle when laid forward; and crown area of upper molars obviously greater (m^2 usually 1.30 to 1.50 by 1.70 to 2.00 mm. instead of 1.15 to 1.30 by 1.55 to 1.70 mm.), see Plate 1, Figure 2 (p. 7).

External characters.—The general external characters do not differ appreciably from those of *Myotis nigricans* except that the entire animal is larger and more heavily built, the foot is more robust and the ear is longer, usually 14 to 15 mm. This last feature is especially well developed in one of the local forms occurring in the Andean region.

Fur and color.—The fur tends to be longer and more silky than in *Myotis nigricans* (longest hairs at middle of back about 8 mm.), and in some of the races the glossy tips to the hairs on the dorsal surface are more conspcuous, though not sufficiently abundant to produce a definite sheen like that which occurs in *M. albescens.* The general color ranges from a rich, dark brown to light grayish or yellowish.

Skull and teeth.—Except for their greater size the skull and teeth do not show any special peculiarities as compared with those of *Myotis nigricans.* Brain case smooth, with at most a slightly developed sagittal crest.

Remarks.—The differences between *Myotis chiloënsis* and *M. nigricans* are not very obvious at first sight, but the two animals appear to be perfectly distinct from each other. In collections *Myotis nigricans* is the commoner of the two, and the material examined appears to show that it has the wider geographical range. The grayish and yellowish forms of *Myotis chiloënsis* are at once distinguishable from *M. nigricans* by their color alone, no corresponding phases of the smaller animal having yet been discovered. The same is true of the largest race; it obviously exceeds all known forms of *M. nigricans* in size. True *M. chiloënsis* and a dark form rather widely distributed in the central Andean region are less easily recognized, as their size and general color are not very different from those of the better known species. The longer ears and greater area of the molar crowns are, however, sufficiently obvious features to be diagnostic.

MYOTIS CHILOËNSIS CHILOËNSIS (Waterhouse)

Vespertilio chiloënsis WATERHOUSE, Zool. Voyage H. M. S. Beagle, pt. 2, Mammalia, p. 5, pl. 3, 1838.—TEMMINCK, Monogr. de Mamm., vol. 2, p. 271, 1840.—GERVAIS, in Gay's Hist. Chile, Zool., vol. 1, p. 42, 1847; Atlas, Mammalogie, pl. 1, figs. 3, *3a*; Expéd. dans l'Amérique du Sud du Castelnau, Zool., Mamm., p. 83, pl. 15, figs. 4–*4d*, 1855 (part).—DOBSON, Catal. Chiroptera Brit. Mus., p. 322, 1878.—WAGNER, Schreber's Säugth., Suppl., vol. 1, p. 537, 1844; vol. 5, p. 753, 1855.—LATASTE, Actes Soc. Sci. Chile, vol. 1 (1891), p. 79, 1892.—TROUESSART, Catal. Mamm. viv. foss., p. 131, 1897.

Vespertilio gayi LATASTE, Actes Soc. Sci. Chile, vol. 1 (1891), pp. 79, 81, 1892 (Valdivia, Chile).

Myotis chiloënsis TROUESSART, Catal. Mamm. viv. foss., suppl., p. 94, 1904.

Myotis gayi TROUESSART, Catal. Mamm. viv. foss., suppl., p. 94, 1904.

Type locality.—Islets on the eastern side of Chiloë Island, southern Chile.

Type specimen.—The type was collected in January, 1836, by Lieutenant Sullivan. It is not positively known to be extant, but there is an unregistered specimen in the Tomes collection, British Museum, which may be the one taken by Sullivan. It was received by Tomes from the Zoological Society of London and has been labeled by Thomas as possibly the type.

Distribution.—Typical *Myotis chiloënsis* is found on the damp cloud-wrapped coast of southwestern Chile, where the "humid and impervious forests" seemed to Darwin, who brought back the original specimen, most uncongenial to a bat. It was during this same voyage of the "Beagle" that Darwin saw a small bat at Tierra del Fuego, but did not capture it.

Diagnosis.—A dark, saturate race; size small; back lacking almost entirely the shining tips to the longer hairs; underparts uniform smoky brown, paling very slightly in the mid-ventral line.

Color.—General color above dark brown, nearly "Vandyke brown" (Ridgway, 1912), the bases of the hairs scarcely darker. Below, the general tint is less dark, becoming brownish and gray in the center of the abdomen through the presence of pale tips to the long hairs. The dorsal hairs seem to lack the burnished tips almost completely.

Measurements.—For measurements see tables, pages 195 and 196.

Specimens examined.—Total number 8, from the following localities:

CHILE: Temuco, Petal, 2 skins, 4 alc. (B. M.), 1 alc. (U.S.N.M.); no exact locality, 1 alc. (B. M.).

Remarks.—*Myotis chiloënsis chiloënsis* is the darkest race of the species. Between southern Bolivia and south-central Chile (Temuco) no specimens from the higher elevations are available to show the transition between it and *M. c. dinellii* of the drier country east of the Andes. Passing northward along the coast the dark form soon pales into the desert race *atacamensis*.

There seems little doubt that the *Vespertilio gayi* Lataste, based on the description of *Vespertilio chiloënsis* in Gay's Historia de Chile, is this same animal. The account in Gay's Historia was based on a specimen from Valdivia, Chile, where the author had found it common in the houses. The specimen he described and figured was abnormal in having the second upper premolar crowded inward from the tooth row so as to stand in the angle between first and third premolars. The forearm measurement (1 inch and 3 lines—French translated into Spanish) was about 35 mm., the same as in small individuals of *M. chiloënsis chiloënsis*. Apparently no other *Myotis* has been discovered so far south in Chile. While no specimens are at hand from Valdivia, those from Temuco, only a short distance to the northward, represent typical *M. chiloënsis*.

Lataste mentions a breeding colony of these bats which he found on November 21 in a disused copper foundry; he captured several adult females and found that each contained a single embryo or had just given birth to its young.

MYOTIS CHILOËNSIS DINELLII Thomas

Vespertilio chiloënsis DOBSON, Catal. Chiroptera Brit. Mus., p. 322, 1878 (part).

Vespertilio sp. THOMAS, Ann. and Mag. Nat. Hist., ser. 6, vol. 20, p. 214, August, 1897.

Myotis dinellii THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 10, p. 493, December, 1902.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 94, 1904.

Type locality.—Tucuman, Catamarca Province, Argentina.

Type specimen.—Female, skin and skull, No. 0.7.9.4 British Museum (Natural History), from Tucuman, Catamarca Province, Argentina. Collected April 7, 1899, by L. Dinelli.

Distribution.—Argentina, Uruguay, and Bolivia; exact limits of range not known.

Diagnosis.—A bright yellowish-brown race of *Myotis chiloënsis;* throat and belly grayish buff; color of back uniform, without speckling.

Description.—Color above varying from deep "ochraceous buff" (Tucuman skins) to light "ochraceous tawny" (Bolivia). The long hairs of the back are the usual blackish brown for their basal two-thirds, and the light-colored tips are slightly burnished. Below, the hairs are brownish black basally, with fine buffy tips, giving to the throat, chest, and belly a general dull grayish-buff cast, in some specimens washed lightly with ochraceous. Ears and membranes brownish black.

Measurements.—For measurements see tables, pages 195 and 196.

Specimens examined.—Total number 40, from the following localities:

ARGENTINA: Chubut, Gaiman, 2 alc. (B. M.); Cordoba, 4 alc. (B. M.), 8 alc. (U.S.N.M.); Mendoza, 1 alc. (B. M.), 1 alc. (M. C. Z.), 3 alc. (U.S.N.M.); Merced, Salta Province, 1 alc. (B. M.); Neuquen, 1 alc. (B. M.); northwestern Argentina, 2 alc. (B. M.); Pampa Grande, 2 alc. (B. M.); Tucuman, Catamarca Province, 5 skins (B. M.); Upper Cachi, Salta Province, 1 skin, 2 alc. (B. M.); Valle de Lerma, Salta Province, 1 skin (B. M.).

BOLIVIA: Paratani, 1 skin (B. M.).

URUGUAY: Dept. of Soriano, 1 alc. (B. M.); no exact locality, 4 alc. (U.S.N.M.).

Remarks.—East of the Andes the increasing dryness of the climate finds a response in the brightening hue of the *chiloënsis* bats. A skull from Salta Province, Argentina (6.5.8.2 B. M.) lacks the minute middle premolar on both sides of the upper jaw, while the first premolar stands fully in the tooth row and fills the entire space between canine and third premolar (p^4).

MYOTIS CHILOËNSIS ATACAMENSIS (Lataste)

Vespertilio atacamensis LATASTE, Actes Soc. Sci. Chile, Santiago, vol. 1 (1891), p. 79, 1892 (Atacama, Chile).—PHILIPPI, Anales Mus. Nac. de Chile, sect. 1, zool., No. 13, p. 5, pl. 1, fig. *a–d*, 1896.—TROUESSART, Catal. Mamm. viv. foss., p. 130, 1897 (as synonym of *V. nigricans*).

Myotis atacamensis TROUESSART, Catal. Mamm. viv. foss., suppl., p. 94, 1904.

Type locality.—Atacama, Chile.

Type specimen.—Mounted specimen, No. 277, National Museum of Chile. Collected February, 1885.

Distribution.—This bat seems to be common in the vicinity of Santiago and Valparaiso, Chile, but how much farther north it occurs at the lower levels can not yet be said. With increasing dryness northward and lack of suitable shelter it no doubt becomes rare or absent altogether at the lower elevations. A single specimen from Ollantaytambo, Peru, altitude 9,400 feet, appears to be not distinguishable from the Chilean skins.

Diagnosis.—Similar in size and proportions to *Myotis chiloënsis chiloënsis* but color a light dull (not yellowish) brown above, grayish below.

Color.—General color above a grayish brown, ranging from nearly "wood brown" (Ridgway, 1912) to drab; the tips of the long hairs faintly glossy. Below, the general color of the surface is grayish white, more or less washed with brownish, especially at the sides and under the chin. The individual hairs are plumbeous at the base tipped with grayish white or brownish white, except at the extreme sides of the abdomen and in the anal region, where the hairs are clear white throughout. Membranes blackish brown.

Skull.—The skull is like that of true *M. chiloënsis*, with a rather marked narrowing of the braincase anteriorly, and a weakly developed sagittal crest. The two minute upper premolars are seldom exactly in the line of the toothrow, but are usually drawn slightly inward, with a tendency for the longer anterior tooth to stand partly to the palatal side of the base of the canine.

Measurements.—For measurements see tables, pages 195 and 196.

Specimens examined.—Total number 12, from the following localities:

CHILE: Santiago, 6 skins (B. M.); Valparaiso, 3 skins (B. M.); no exact locality, 2 skins (B. M.).
PERU: Ollantaytambo, 1 skin (U.S.N.M.).

Remarks.—It is well known that as one proceeds northward coastwise, from southern Chile, the country becomes dry and even desert in contrast to the damp cool climate of the southern coast. These drier conditions have had their effect on the local representatives of *Myotis chiloënsis*, producing a pale-brown race with grayish-white belly, in contrast with the excessively dark *M. chiloënsis chiloënsis* of the humid coast region, and the yellowish *M. c. dinellii* of the dry country east of the Andes.

MYOTIS CHILOËNSIS OXYOTUS (Peters)

Vespertilio oxyotus Peters, Monatsber. K. Akad. Wiss. Berlin, 1866, p. 19.—Dobson, Catal. Chiroptera Brit. Mus., 1878, p. 320.—Trouessart, Catal. Mamm. viv. foss., p. 130, 1897.

Myotis thomasi Cabrera, Bol. Soc. Españ. Hist. Nat., Madrid, vol. 1, p. 370, 1901; vol. 2, p. 293, 1902 (Archidona, near headwaters of the Rio Napo, Ecuador).—Trouessart, Catal. Mamm. viv. foss., suppl., p. 95, 1904.

Myotis oxyotus Trouessart, Catal. Mamm. viv. foss., suppl., p. 94, 1904.—J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 384, July 9, 1914.

Myotis sp. Osgood, Field Mus. Nat. Hist., publ. 176, zool. ser., vol. 10, p. 182, April 20, 1914.

Type locality.—Mount Chimborazo, Ecuador, at 9,000 to 10,000 feet altitude.

Type specimen.—A female (? in alcohol) in the Zoological Museum of Munich, Germany, collected at 9,000 to 10,000 feet on Mount Chimborazo, Ecuador, by Dr. Moritz Wagner.

Distribution.—Andean region from northern Ecuador southward into Peru, and probably to northern Argentina.

Diagnosis.—Very similar to typical *Myotis chiloënsis* in general appearance, but color less dark, glistening tips of longer hairs on back more conspicuous, and ear usually longer.

Color.—Upper surface nearly "Mars-brown" (Ridgway, 1912) or occasionally not so dark, gradually darkening to blackish slate at the bases of the hairs. The tips of the longer hairs have a conspicuous buffy gloss imparting a finely speckled appearance to the entire back. Below, the colors are much the same as on the dorsal surface, but the buffy tips are paler and more abundant, producing a definite wash of dull whitish without gloss.

Measurements.—The dimensions of the type as given by Peters, are: Total length, 93 mm.; tail, 46; foot, 6; ear, 17; tragus, 8; forearm, 40; third digit, 63; fourth digit, 55; fifth digit, 52; tibia, 16.5; calcar, 14. For measurements of the material examined, see tables, pages 195 and 196.

Specimens examined.—Total number 35, from the following localities:

BOLIVIA: Chulumani, 2000 meters, 2 skins, 1 alc. (B. M.).

ECUADOR: Loja, 200 meters, 1 skin (B. M.); Pallatanga, 1 skin (A. M. N. H.); Santa Rosa, Loja, 4 alc. (B. M.); Sigsig, 8500 feet, 5 skins (B. M.); no exact locality, 1 skin, 1 alc. (B. M.).

PERU: Chachapoyas, 7600 feet, 1 skin (B. M.); Hacienda Limon, 3 miles west of Balsas, 1 alc. (F. M.); Inambiri River, Carabaya, 1 skin (M. C. Z.); Inca Mines, 1 skin (A. M. N. H.); Iquente, 1 alc. (U.S.N.M.); Junin, Rumicruz, 2 skins (A. M. N. H.); Rio Negro, 1 skin (A. M. N. H.); Santa Ana, 3500 feet, 3 skins, 7 alc. (U.S.N.M.); Surco, near Lima, 1 alc. (B. M.).

MYOTIS CHILOËNSIS ALTER, new subspecies

Type locality.—Palmeiras, Parana, Brazil.

Type specimen.—Adult female (in alcohol), No. 0.6.29.23, British Museum (Natural History). Collected at Palmeiras, Parana, Brazil, by G. Grillo. Received from Genoa Museum.

Distribution.—Eastern Argentina and southern Brazil.

Diagnosis.—Like *Myotis chiloënsis oxyotus* but general size greater, and skull, in particular, larger, its total length ranging from 15 to 16.2 mm. instead of from 14.2 to 15 mm.

Measurements.—For measurements see tables, pages 195 and 197.

Specimens examined.—Total number 21, from the following localities:

ARGENTINA: Buenos Aires Province, General Lavalle, 4 skins (M. C. Z.), 3 skins, 6 alc. (B. M.), 2 alc. (U.S.N.M.); Chubut, 1 alc. (B. M.).

BRAZIL: Palmeiras, Parana, 5 alc. (B. M.).

Remarks.—Apart from its larger size *Myotis chiloënsis alter* differs in no appreciable character from the Andean *M. c. oxyotus.*

External measurements of Myotis chiloënsis

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis chiloënsis chiloënsis													
Chile:													
Temuco	242902	♂	43.0	39.0	15.2	8.0	37.0	6.0	33.0	31.2	14.4	11.0	8.0
Do	10.6.26.5 B. M.	♂	41.0	40.6	15.0	8.0	37.0	6.6	33.2	32.8	13.6	10.0	8.6
Do	10.6.26.6	♀	45.0	38.8	16.8	8.0	38.0	6.0	34.0	32.4	14.4	10.8	8.4
Do	10.6.26 Dupl.	♀	45.8	38.8	17.0	7.8	39.0	6.4	35.8	33.8	15.4	12.4	8.6
Myotis chiloënsis dinellii													
Argentina:													
Cordoba	2 B. M.	♀	48.4	44.8	14.4	7.4	37.6	5.0	34.2	33.6	14.6	11.8	9.2
Do	1 B. M.	♀	47.4	42.0	15.6	7.2	38.2	5.4	35.4	34.4	14.6	11.0	9.0
Mendoza	71.11.28.11. B. M.	♀	44.0	40.4	15.6	7.2	38.0	6.0	34.8	33.2	14.0	12.0	9.0
Neuquen	14.4.4.6	♂	47.8	35.8	16.4	7.2	39.4	6.4	34.6	33.6	14.0	11.0	8.6
Pampa Grande	97.5.5.8	♂	49.4	37.5	15.2	7.0	37.2	6.2	35.0	33.6	14.0	12.2	9.0
Salta Province, Merced	6.5.8.2	♂	43.0	42.8	16.2	7.8	38.0	5.8	34.8	33.6	14.4	11.0	8.6
Upper Cachi	97.5.5.5	♀	44.0	38.0	-----	7.0	36.2	----	34.8	32.8	14.0	-----	----
Do	97.5.5.7	♀	50.0	39.6	16.2	7.6	38.0	6.0	35.0	33.8	14.2	11.6	8.4
Tucuman	0.7.9.5	♂	47.0	41.0	15.0	9.0	37.4	----	35.0	33.4	14.0	-----	----
Do	1.6.3.2	♂	43.0	40.0	15.4	6.5	37.4	----	33.6	32.4	15.0	-----	----
Valle de Lerma	6.5.8.1	♂	48.0	40.0	16.0	7.0	38.0	5.0	33.6	33.0	13.0	-----	----
N. W. Argentina	97.5.5.3	♀	45.4	42.6	16.6	7.4	40.0	5.6	37.8	36.4	15.0	12.2	9.0
Do	97.5.5.4	♀	45.2	39.8	14.6	8.2	36.6	6.0	34.4	33.2	14.2	12.0	9.2
Uruguay	102588	♀	45.8	40.0	16.0	8.0	38.6	6.2	35.8	34.8	14.8	12.0	8.6
Do	102589	♀	42.4	40.0	16.6	8.0	39.2	6.0	35.4	34.6	14.2	11.0	9.0
Do	102590	♀	43.0	38.0	16.2	7.8	36.6	7.2	34.6	34.2	14.4	11.4	8.6
Myotis chiloënsis atacamensis													
Chile:													
Santiago	3.12.2.1 B. M.	♂	52.0	42.0	16.0	7.0	40.0	5.0	37.0	35.4	13.0	-----	----
Do	3.12.2.2	♂	48.0	40.0	-----	6.0	37.8	5.6	34.0	32.8	-----	-----	----
Do	3.12.2.3	♀	50.0	40.0	-----	7.0	39.4	5.4	35.2	34.6	14.2	-----	----
Do	3.12.2.4	♀	48.0	38.0	-----	6.0	38.8	5.6	34.0	33.0	14.0	-----	----
Do	3.7.3.3	♂	50.0	36.0	-----	7.0	38.0	5.4	34.8	33.0	14.0	-----	----
Do	4.1.7.2	♀	47.0	44.0	-----	10.0	40.0	5.8	36.6	35.4	14.0	-----	----
Valparaiso	1.3.21.1	♂	49.0	43.0	15.6	8.0	35.0	5.8	33.2	31.2	-----	-----	----
Do	2.11.6.1	♂	49.0	40.0	14.2	9.0	36.6	5.0	-----	-----	-----	-----	----
Do	97.5.1.1	♂	51.0	31.0	-----	10.0	35.0	5.2	32.6	31.2	-----	-----	----
Peru: Ollantaytambo	194451	♂	49.4	40.2	18.0	8.2	37.4	6.4	33.4	32.0	-----	-----	----
Myotis chiloënsis oxyotus													
Ecuador:													
Santa Rosa	99.12.7.9.B. M.	♀	40.4	42.0	16.6	7.2	41.6	5.8	38.0	35.8	14.4	12.2	8.0
Do	99.12.7.10	♀	41.2	43.6	16.2	7.2	40.2	5.2	35.6	34.2	14.2	11.0	9.0
Do	99.12.7.11	♀	40.0	43.0	16.2	7.0	39.0	5.4	35.8	34.8	12.8	9.8	8.4
Do	99.12.7.12 yg	♀	40.0	43.0	16.0	7.4	38.0	6.0	33.6	31.6	13.0	10.4	8.0
Archidona	[1] Madrid	♀	46	40	15	9	39	6	33	31	13	-----	----
Mt. Chimborazo	[2] Berlin	♀	47	46	16.5	6	40	7.5	36.4	34	17	-----	8
Peru:													
Surco	0.5.7.38 B.M.	♂	43.6	47.6	18.2	8.0	40.2	5.2	37.8	35.4	16.0	15.4	10.0
Hda. Limon	19969 F. M.	♀ juv.	40.4	42 4	17.6	7.6	41.6	6.8	36.2	35.2	13.6	11.6	8.0
Iguente	195145	♀	45.0	44.0	17.6	8.0	40.2	5.0	37.8	35.0	14.6	13.2	7.4
Santa Ana	195141	♀	46.4	45.6	17.2	7.4	41.0	5.6	36.8	35.6	14.8	12.6	7.6
Do	195142	♂	47.4	46.2	18.4	8.4	41.6	6.4	37.8	36.0	15.0	12.2	8.2
Do	195144	♀ juv.	46.0	41.2	16.4	7.8	38.2	5.8	33.4	31.6	14.0	13.0	8.0
Do	195147	♀	46.0	45.0	17.4	8.0	41.2	6.0	36.6	35.0	15.0	12.0	8.0
Do	195148	♀	46.6	45.0	17.6	8.2	40.4	6.2	38.0	37.8	15.0	14.0	8.4
Do	195149	♀	48.0	43.3	17.2	8.0	40.6	6.0	38.0	35.4	15.0	11.6	9.0
Bolivia: Chulumani	2.2.2.125 B. M.	♀	46.2	42.4	17.2	7.2	40.0	5.8	36.2	35.0	14.4	13.0	9.0
Myotis chiloënsis alter													
Brazil:													
Palmeiras	0.6.29.21 B. M.	♂	48.2	45.4	18.2	8.8	39.0	5.0	38.2	36.8	15.8	12.2	9.4
Do	0.6.29.22	♂	50.0	46.4	18.2	8.6	40.0	7.0	39.0	37.6	15.8	12.0	9.0
Do	0.6.29.23	♀	51.4	47.6	19.0	8.6	43.0	7.0	38.4	38.0	15.2	12.0	10.0
Do	[3] 0.6.29.24	♀	49.0	45.0	18.0	8.0	42.8	7.0	39.0	38.0	15.4	12.6	10.0
Do	90.6.20.1	♀	50.0	43.6	17.0	8.5	43.2	7.0	38.4	37.8	15.2	12.4	9.8

[1] Type of *Myotis thomasi* Cabrera (from Cabrera).

[2] Type (from Peters).

[3] Type.

External measurements of Myotis chiloënsis—Continued

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Myotis chiloënsis alter—Con.													
Argentina:													
General Lavalle	9.12.1 Dupl. B. M.	♂	51.0	39.6	16.8	8.2	39.2	5.0	35.6	34.0	14.8	12.4	8.8
Do	9.12.1.67	♀	49.8	39.4	15.0	8.2	36.0	7.0	34.4	33.6	14.6	12.0	9.6
Do	13 B. M.	♂	54.0	39.2	17.4	8.0	40.0	6.8	36.4	35.8	14.8	12.8	8.8
Do	30	♂	50.2	38.0	16.2	8.6	37.0	7.0	34.0	32.8	14.6	12.4	8.0
Do	38	♀	52.0	41.8	17.2	8.0	40.6	7.4	37.6	36.0	15.0	11.8	8.8
Do	236236	♂	49.8	41.0	16.0	8.8	37.0	6.0	34.0	32.6	15.0	11.4	8.8
Do	236237	♂	48.4	38.0	16.0	8.6	36.6	6.8	35.2	33.2	14.0	12.2	9.0

Cranial measurements of Myotis chiloënsis

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital Constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis chiloënsis chiloënsis													
Chile:													
Temuco	10.6.26.8 B.M.	♀	15.0	14.0	9.1	3.9	7.3	5.0	11.3	5.7	6.2	6.0	1
Do	10.6.26.5	♂	14.4	13.8	9.0	3.8	7.2	5.0	----	5.4	5.9	5.9	1
Do	10.6.26.6	♀	14.7	13.9	8.9	3.8	7.0	5.0	11.0	5.6	5.8	5.9	2
Do	11.10.16.1	♀	14.8	13.9	9.0	3.9	7.0	5.0	10.8	5.6	5.8	6.1	----
Do	11.10.16.2	♀	14.7	14.0	----	4.0	7.3	5.2	10.8	5.4	6.0	5.9	----
Myotis chiloënsis dinellii													
Argentina:													
Tucuman	1.6.3.2 B.M.	♂	14.8	13.7	8±	3.8	7.0	4.9	10.5	5.5	5.8	5.8	1
Do	1.6.3.3	♀	----	----	8.8	3.8	----	----	10.8	5.6	5.9	6.0	2
Do	1.6.3.4	♀	14.8	13.9	9.0	3.7	7.0	4.9	10.6	5.5	5.8	6.0	1
Valle de Lerma	6.5.8.1	♂	14.6	13.7	----	3.6	7.0	5.0	10.3	5.4	5.7	5.8	1
Salta Prov., Merced	6.5.8.2	----	----	13.2	----	3.5	6.8	4.8	10.1	5.4	5.4	5.7	1
Upper Cachi	97.5.5.5	♀	14.2	13.3	----	3.5	6.8	4.9	10.3	5.2	5.4	5.8	2
Mendoza	71.11.28.11	♀	14.8	13.8	9.0	3.8	7.0	5.0	10.9	5.5	5.6	5.7	2
Do	19450 M.C.Z.	♀	14.8	13.7	8.8	3.5	7.2	4.8	10.6	5.6	5.8	6.0	1
Neuquen	14.4.4.6 B.M.	♀	15.0	14.1	9.3	3.9	7.2	5.0	11.0	5.7	5.9	6.1	1
Myotis chiloënsis atacamensis													
Chile:													
Santiago	3.12.2.1 B.M.	♂	15.0	14.5	----	3.7	7.1	5.0	11.0	5.7	5.6	6.0	1
Do	3.12.2.2	♂	14.3	13.1	----	3.6	7.0	5.0	9.8	5.4	5.6	5.7	1
Do	3.12.2.3	♀	14.7	13.8	----	3.6	7.0	5.0	10.4	5.7	5.6	6.0	1
Do	3.12.2.4	♀	14.3	13.6	----	3.5	7.0	4.9	10.8	5.7	5.7	6.0	1
Do	4.1.7.2	♀	14.8	14.0	----	4.1	7.1	5.1	10.8	5.7	5.9	6.0	2
Do	3.7.3.3	♂	14.8	14.2	8.8	3.6	7.0	5.0	10.9	5.7	5.7	6.1	2
Valparaiso	2.11.6.1 B.M.	♂	14.5	13.5	----	3.8	7.0	5.1	10.3	5.6	5.5	5.9	1
Peru: Ollantaytambo	194451	♂	14.0	13.0	----	3.3	6.6	5.1	9.7	5.2	5.7	5.5	0
Myotis chiloënsis oxyotus													
Ecuador:													
Sta. Rosa	99.12.7.9 B.M.	♀	15.0	14.2	9.0	3.7	7.1	5.2	11.0	6.0	5.8	6.0	1
Do	99.12.7.10	♀	14.6	14.1	8.8	3.5	7.0	5.0	10.9	5.8	5.8	6.1	1
Do	9.12.7.11	♀	14.2	13.2	7.8	3.2	6.6	5.0	10.0	5.6	5.8	5.8	0
Sigsig	14.4.25.8	♀	14.6	13.6	----	3.6	7.0	5.0	----	5.4	5.6	----	2
Do	14.4.25.9	♀	14.6	13.5	----	3.7	7.0	5.2	10.6	5.6	5.7	5.8	1
Do	14.4.25.10	♀	14.8	13.8	----	3.7	7.0	5.0	11.0	5.7	5.8	6.0	1
Loja	0.2.9.10	♀	14.5	13.8	9.0	3.6	7.1	5.1	10.8	5.7	5.9	6.0	1
No exact locality	78.6.24.3	♂	15.0	13.8	8.6	3.7	7.1	5.1	10.5	5.7	6.0	6.0	1
Peru:													
Santa Ana	194452 U.S.N.M.	♂	14.8	13.5	8.8	3.6	7.1	5.0	10.3	5.6	5.9	6.0	1
Do	194453	♀	14.9	14.0	8.6	3.6	6.9	5.0	10.6	5.7	5.6	5.6	1
Do	194454	♀	14.5	13.7	----	3.5	6.9	5.0	10.9	5.4	5.6	6.0	2
Surco	0.5.7.38 B.M.	♂	15.0	14.3	9.0	3.7	7.4	5.3	10.9	5.9	5.8	6.1	1
Hda. Limon	19969 F.M.	♀ Juv	15.0	13.9	----	3.6	7.2	5.4	10.8	5.7	5.7	6.0	0

Cranial measurements of Myotis chiloënsis—Continued

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital Constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Myotis chiloënsis oxyotus—Continued													
Bolivia:													
Chulumani	1.6.7.1 B.M.	♀	14.2	13.5	----	3.6	7.0	5.0	10.7	5.6	5.7	5.9	1
Do	1.6.7.2	♀	14.8	13.6	8.8	3.7	7.5	5.0	10.4	5.5	5.7	5.9	1
Do	2.2.2.125	♀	14.8	13.9	9.0	3.7	6.9	5.0	10.5	5.6	5.7	5.9	2
Myotis chiloënsis alter													
Brazil:													
Palmeiras	0.6.29.21 B.M.	♂	15.4	14.7	----	4.0	7.5	5.4	10.9	6.0	6.2	6.1	0
Do	0.6.29.22	♂	15.6	14.8	9.7	4.0	7.6	5.5	11.6	6.1	6.3	6.5	0
Do	[1] 0.6.29.23	♀	16.2	15.3	10.0	4.0	7.8	5.6	12.0	6.1	6.2	6.5	1
Do	0.6.29.24	♀	15.8	14.9	9.3	3.6	7.4	5.4	11.4	6.0	6.2	6.4	0
Do	90.6.20.1	♀	-----	-----	----	----	----	----	-----	6.1	----	6.4	0
Argentina:													
General Lavalle	19509 M.C.Z.	----	-----	14.5	10.0	4.0	7.6	5.5	11.2	5.6	6.0	6.0	2
Do	19510	♂	15.1	14.2	9.5	4.0	7.2	5.2	10.8	5.6	6.0	6.0	1
Do	19511	♂	15.2	14.3	9.7	4.2	7.4	5.4	11.0	5.8	6.0	6.0	1
Do	19512	♂	15.6	14.8	9.9	4.1	7.7	5.5	11.0	5.7	6.0	6.0	2
Do	236236 U.S.N.M.	♂	15.0	14.4	9.2	3.8	7.4	5.0	-----	5.8	6.0	----	1
Do	236237	♂	15.2	14.2	9.2	3.8	7.6	5.4	-----	5.8	6.0	----	0
Do	9.12.1.5 B.M.	♂	15.2	14.8	----	4.0	7.2	5.4	11.1	5.7	6.0	6.0	1
Do	9.12.1.6	♂	15.2	14.5	----	3.8	7.6	5.3	10.6	5.7	6.0	6.2	1
Do	9.12.1.7	♂	15.6	14.6	9.4	4.0	7.6	5.2	11.3	5.8	6.1	6.2	1

[1] Type.

MYOTIS RUBER (E. Geoffroy)

Vesp[ertilio] ruber E. GEOFFROY-SAINT-HILAIRE, Ann. Mus. d'Hist. Nat. Paris, vol. 8, p. 204, 1806 (based on Azara's Chauve-souris onzième, 1801).—FISCHER, Synopsis Mamm., p. 110, 1829.—SCHINZ, Syst. Verzeich. Säugeth. oder Synopsis Mamm., vol. 1, p. 190, 1844.—D'ORBIGNY and GERVAIS, Voy. dans l'Amér. Mérid., vol. 4, pt. 2, p. 14; atlas, mamm., pl. 11, fig. 5–6, 1847.—GERVAIS, Expéd. Amér. du Sud du Castelnau, zool., mammifères, p. 80 (part; not pl. 14, fig. 3–3 b, = *Tadarida*), 1855.

Vespertilio polythrix I. GEOFFROY-SAINT-HILAIRE, Ann. des Sci. Nat., ser. 1, vol. 3, p. 443, 1824 (Rio Grande do Sul and Minas Geraes, Brazil).—FISCHER, Synopsis Mamm., p. 111, 1829.—TEMMINCK, Monogr. de Mamm., vol. 2, p. 248, 1840.—SCHINZ, Syst. Verzeich. Säugeth. oder Synopsis Mamm., vol. 1, p. 187, 1844.—GERVAIS, Expéd. Amér. du Sud du Castelnau, zool., mammifères, p. 83, 1855.—DOBSON, Catal. Chiroptera Brit. Mus., p. 321, 1878.—TROUESSART, Catal. Mamm. viv. foss., p. 131, 1897.

Vespertilio (*Myotis*) *kinnamon* GERVAIS, Expéd. Amér. du Sud du Castelnau, zool., mammifères, p. 48, pl. 15, fig. 1 (teeth), 1855 (Capella Nova, Brazil).

Vespertilio albescens TEMMINCK, Monogr. de Mamm., vol. 2, p. 244, 1844 (not of Geoffroy; Temminck's description was based on one of Natterer's specimens which later served as types of *V. nubilus* Wagner).

Scotophilus (*Pachyotus*) *polythrix* GRAY, Mag. Zool. and Bot., vol. 2, p. 498, 1838.

Vespertilio nubilus WAGNER, Schreber's Säugthiere, suppl., vol. 5, p. 752, pl. 51, fig. 3 (head), 1855 (southern Brazil).—VON PELZELN, Verh. K. K. Zool.-Bot. Ges. Wien, vol. 33, Beiheft, p. 44, 1883.

Vespertilio cinnamomeus WAGNER, Schreber's Säugthiere, suppl., vol. 5, p. 755, 1855 (renaming of *V. ruber*).

Vesperus polythrix FITZINGER, Sitzungsber. Akad. Wissensch. Wien, vol. 62, pt. 1, p. 143, 1870.

Nyctophylax nubilus FITZINGER, Sitzungsber. Akad. Wissensch. Wien, vol. 62, pt. 1, p. 561, 1870.

Myotis ruber THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 10, p. 493, December, 1902.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 94, 1904.

Myotis polythrix TROUESSART, Catal. Mamm. viv. foss., suppl., p. 94, 1904.

Type locality.—Paraguay, probably near Asuncion.

Type specimen.—None specified; the name is based on Azara's "Chauve-souris onzième, ou Chauve-souris cannellé."

Distribution.—The range can not at present be accurately defined. It probably includes, however, southern and eastern Brazil, all of Paraguay, northeastern Argentina, and the adjacent part of Peru.

Diagnosis.—Like *Myotis chiloënsis* but skull of adult normally with a conspicuous sagittal crest, and color usually reddish. Distinguishable from *M. nigricans* in the red phase by larger general size, more robust teeth, and the normal presence of a sagittal crest.

External form.—The general external features, except as they are modified by the animal's larger size, do not differ appreciably from those of *Myotis chiloënsis* and *M. nigricans.* The foot, however, is proportionally as well as actually larger than is usual in either of the better known species, the ratio of its length to that of tibia averaging 54.1 in five specimens from Paraguay. Calcar, as in *M. chiloënsis* and *M. nigricans*, with a low but usually obvious keel. Ear as long, relatively to muzzle, as in *M. chiloënsis*, extending when laid forward about 2 mm. beyond nostril.

Fur and color.—The pelage in both quality and distribution is essentially as in *Myotis nigricans.* The hairs on the upper part of the back are longest, about 6 mm.; they lack conspicuous burnished tips.

There are, as in *Myotis nigricans*, two well-defined color phases, rufous and brown, but, contrary to the conditions prevailing in the smaller animal, it is the rufous phase which appears to be dominant. In rufous pelage the entire dorsal surface to the roots of the hairs is a bright "ochraceous tawny" (Ridgway, 1912), darkening on the muzzle and on the chin to maroon or "russet," the tips of the hairs without evident gloss. The under side of the body is a peculiar tint of brownish yellow, close to "yellow ocher" (Ridgway), well shown in D'Orbigny and Gervais's figure; the bases of the hairs are darker, nearly "Prout's brown." In the brown phase, upper parts "Prout's brown," darkening at bases of hairs to "mummy brown," the tips of the hairs with a slight gloss; underparts essentially similar to back, but the color so lightened as to suggest a dirty buff, darker on chin and throat, paler posteriorly.

Skull and teeth.—The cranial and dental characters are essentially like those of *Myotis chiloënsis* except that the skull is more heavily built and the sagittal and lambdoid crests are better developed. A noticeable sagittal crest appears to be always normally present in adult skulls imparting to the brain case a characteristic ridged appearance quite different from the nearly smooth surface usually seen in *M. chiloënsis* and in the smaller *M. nigricans.*

Measurements.—For measurements see tables, pages 199 and 200.

Specimens examined.—Total number 10, from the following localities:

BRAZIL: Rio Grande do Sul, San Lorenzo, 2 alc. (B. M.); no exact locality, 1 skin (B. M.).

PARAGUAY: Sapucay, 1 skin, 2 alc. (B. M.); 1 skin, 1 alc. (U.S.N.M.).

"SOUTH AMERICA": 2 skins (B. M.).

Remarks.—Although named more than 120 years ago on the basis of Azara's description, *Myotis ruber* is still rather imperfectly known. The exterior was well represented by D'Orbigny and Gervais, but they figured and described the teeth as $i\,\frac{1}{2}$, $c\,\frac{1}{1}$, $m\,\frac{5}{5}$, thus following Azara, who says, "Dans la mâchoire d'en-haut, est une incisive de chaque coté, laissant un espace au milieu; ensuite vient une canine. En-bas, il paraît y avoir deux incisives réunies, et tout de suite deux canines." Temminck had already doubted the correctness of Azara's statement regarding the number of incisors, on the basis of the individual (from Corrientes, Argentina) figured by D'Orbigny and Gervais. The skull in question, however, was probably that of a *Tadarida* ("*Nyctinomus*"), presumably the specimen later figured in more detail by Gervais,[17] wherein are seen the minute two-cusped lower incisors of characteristic form. In 1902 Thomas for the first time allocated Geoffroy's name and briefly defined the more salient peculiarities of the species.

External measurements of Myotis ruber

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Paraguay:													
Sapucay	2.11.7.18 B. M.	♂	48.4	46.6	16.8	8.8	40.8	6.4	37.4	35.8	14.8	11.0	9.8
Do	2.11.7.19	♀	48.0	43.0	15.0	8.4	40.0	5.8	37.2	35.0	14.8	10.8	9.2
Do	121478 U.S.N.M.	♀	49.0	46.2	16.0	8.0	40.4	6.8	37.4	36.0	15.0	11.8	9.2
Do	2.11.7.1 B. M.	♀	50.0	38.0	16.4	9.0	40.2	----	36.6	34.6	-----	-----	----
Do	115097 U.S.N.M.	♂	48.6	40.4	15.6	9.0	39.0	----	35.8	34.0	-----	-----	----
Brazil:													
Rio Grande do Sul, San Lorenzo	84.2.8.31 B. M.	♂	50.6	38.4	15.4	7.8	40.0	6.0	36.0	34.2	13.6	13.0	9.0
Do	88.11.30.5 B. M.	♂	48.8	40.2	15.8	8.2	40.2	6.8	36.0	34.4	13.8	12.2	9.6

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[17] Expéd. Castelnau, 1855, pl. 14, fig. 3–3b.

Cranial measurements of Myotis ruber

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Paraguay:													
Sapucay	115097 U.S.N.M.	♂	15.6	14.8	9.8	3.8	7.0	5.7	11.8	6.0	6.3	6.0	1
Do	2.11.7.1 B. M.	♀	15.4	14.9	9.9	3.8	7.0	5.6	11.8	6.1	6.3	6.5	2
Do	2.11.7.18	♂	15.5	15.0	9.8	3.9	7.0	5.4	11.6	6.0	6.2	6.4	2
Do	2.11.7.19	♀	15.1	14.5	-----	4.0	7.0	5.5	11.3	6.0	6.1	6.4	2
Brazil:													
No exact locality	48.5.6.7	----	-----	-----	-----	----	----	----	11.8	6.0	----	6.5	1
Rio Grande do Sul	84.2.8.31	♂	15.6	14.9	10.0	3.6	7.1	5.4	11.8	6.0	6.2	6.5	2
Do	88.11.30.5	♂	15.6	14.7	-----	3.7	7.0	5.4	11.7	6.1	6.0	6.7	1
"South America"	7.1.1.529	----	-----	14.5	-----	3.9	7.1	5.6	11.5	6.0	6.3	6.4	1

MYOTIS ALBESCENS (E. Geoffroy)

Vesp[ertilio] albescens E. Geoffroy, Ann. Mus. d'Hist. Nat. Paris, vol. 8, p. 204, 1806.—Fischer, Synopsis Mamm., p. 110, 1829.—Temminck, Monogr. de Mamm., vol. 2, p. 244, 1840.—Schinz, Syst. Verzeichn. Säugeth. oder Synopsis Mamm., vol. 1, p. 190, 1844.—Peters, Monatsber. K. Akad. Wissensch. Berlin, p. 19, 1866.—Dobson, Catal. Chiroptera Brit. Mus., p. 327, 1878.—H. Allen, Monogr. Bats North Amer., Bull. U. S. Nat. Mus., No. 43 (1893), p. 87, March 14, 1894 (part).

Vespertilio leucogaster Wied, Beitr. z. Naturg. Brasil, vol. 2, p. 271, 1826 (Moucouri River, Brasil); Abbild. z. Naturg. Brasil, pt. 13, text and plate, 1829.—Temminck, Monogr. de Mamm., vol. 2, p. 243, 1840.—Gervais, Expéd. Amér. du Sud du Castelnau, zool., mammifères, p. 80, 1855.

Vespertilio aenobarbus Temminck, Monogr. de Mamm., vol. 2, p. 247, pl. 59, fig. 4, 1840 (South America).—Schinz, Syst. Uebers. Säugeth, oder Synopsis Mamm., vol. 1, p. 189, 1844.

Vespertilio arsinoë Temminck, Monogr. de Mamm., vol. 2, p. 247, 1840 (Surinam).—Schinz, Syst. Uebers. Säugeth. oder Synopsis Mamm., vol. 1, p. 181, 1844.—Gervais, Expéd. Amér. du Sud du Castelnau, zool., mammifères, p. 82, 1855.—Dobson, Catal. Chiroptera Brit. Mus., p. 328, 1878.—Trouessart, Catal. Mamm. viv. foss., p. 132, 1897.

Vespertilio isidori D'Orbigny and Gervais, Voyage dans l'Amér. Mérid., vol. 4, pt. 2, mammifères, p. 16, 1847 (Corrientes, Argentina).—Gervais, Expéd. Amér. du Sud du Castelnau, zool., mammifères, p. 84, 1855.

Vespertilio mundus H. Allen, Proc. Acad. Nat. Sci. Philadelphia, p. 280, 1866 (Maracaibo, Venezuela).—Lyon and Osgood, List Type-Sp. Mamm. U. S. Nat. Mus., Bull. U. S. Nat. Mus., No. 62, p. 291, January 28, 1909.

Aëorestes albescens Fitzinger, Sitzungsber. Akad. Wissensch. Wien, vol. 62, pt. 1, p. 431, 1870.

Myotis albescens Thomas, Ann. Mus. Civ. Storia Nat. Genova, vol. 40, p. 546, July 4, 1900; Ann. and Mag. Nat. Hist., ser. 7, vol. 8, p. 435, November, 1901; vol. 10, p. 494, December, 1902.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 94, 1904.

Myotis arsinoë Trouessart, Catal. Mamm. viv. foss., suppl., p. 94, 1904.

Myotis punensis J. A. Allen, Bull. Amer. Mus. Nat. Hist., vol. 33, p. 383, July 9, 1914 (part); vol. 35, p. 227, May 31, 1916 (specimens from Barbacoas, Colombia).

Type locality.—Paraguay.

Type specimen.—None specified. Geoffroy's name is based on the "chauve-souris douzième" of Azara,[18] hence the type locality is considered to be Paraguay, perhaps near Asuncion where Azara resided.

Distribution.—Warmer parts of America from Costa Rica to Venezuela, Paraguay, and Patagonia. Limits of range imperfectly known.

Diagnosis.—Externally much like *Myotis chiloënsis* except that the foot is slightly larger (average ratio of foot to tibia about 52 instead of about 48 or less), the ear is shorter and the tips to the longer hairs of the posterior half of back, in fresh pelage, usually form a noticeable pale area. Skull with brain case inflated and rostrum relatively short and weak. Cheek teeth much smaller than those of *Myotis chiloënsis* (the crown of m^2 usually 1.20 to 1.25 by 1.35 to 1.50), and smaller relatively to the area of the palate than in *M. chiloënsis* or any other known American member of the genus.

Ears.—The ear is small, narrow and thin; its tip not markedly narrowed, the anterior outline slightly but evenly convex, the posterior outline not noticeably concave below the tip but nearly straight and gradually passing into the convex outer base without making a sharply defined shoulder. Tragus narrow and of nearly the same width throughout, tapering slightly at the tip, its total height less than half the total height from anterior lower margin to tip of ear (about 5.5:12.5 mm.). Laid forward the tip of the ear reaches the nostril.

Wing and membranes.—Wing from the side of the foot at the base of the toes. The metacarpals are slightly and evenly graduated, the third longest (in an average specimen as 32:31.5:31). The fingers are graduated in the same order. Taking the third finger as 100, the fourth and fifth are respectively as 87 and 81 (58.5:51:47.5 mm.). When the wing is folded, the third metacarpal falls short of the elbow by about 2 mm. The fur extends thinly on the under side of the wing as far as a line joining the knee and the proximal third of the humerus. On the interfemoral membrane above it extends only a short distance, about to a line joining the knees. The terminal vertebra of the tail is obviously free.

Foot.—The foot is large, both absolutely and proportionally to the length of tibia. Its length is slightly more than half that of the tibia (average ratio in 7 specimens from Paraguay, 52.5). The calcar is long (about 16 mm.) and exceeds the free border of the interfemoral membrane by about 4 mm. It is usually without a well-defined keel and terminates in a minute projecting lobule.

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[18] Essais sur l'hist. nat. des quadrupèdes du Paraguay, vol. 2, p. 294, 1801.

Fur and color.—The fur is rather thin, of only medium length (4 or 5 mm. at the center of the back), and except under the wing, it extends very little on to the membranes. Its color is characteristic. The basal three-fourths or thereabouts of the hairs is a uniform light chocolate, nearly "Rood's brown" (Ridgway, 1912); the tips of the hairs above are glistening pale buff giving a finely peppered or frosted effect anteriorly and forming, in fresh pelage, a noticeable wash posteriorly. Below, the bases of the hairs are of the same light chocolate, but the terminal portion is clear whitish cartridge producing a contrasted pale ventral surface. Posteriorly the pale tips increase in length until at the edges of the abdomen the hairs are entirely buff. The interramial area is uniformly dark chocolate brown. The membranes are light brownish becoming distinctly pale between the humerus and the legs. The interfemoral membrane is also pale. In immature specimens the dark portions of the fur are nearly sooty, but the pale tips are characteristic. The membranes also are darker, blackish brown.

Skull.—The skull somewhat resembles that of *Myotis chiloënsis*, with which it agrees in general size, but differs from that of all the known South American members of the genus in the relatively large, noticeably globular, smoothly rounded form of the brain case, and the relatively short, weak rostrum. (Pl. 1, p. 7, fig. 8.) The sagittal crest, when present, is never anything more than a low, inconspicuous ridge.

Teeth.—There appear to be no tangible structural characters by which the teeth can be distinguished from those of *Myotis chiloënsis*, except that the transverse diameter of the crown of the upper molars tends to be less in proportion to the diameter along the alveolar line than in *M. chiloënsis* or any of the other known South American species. The full complement of secondary ridges and cusps is present in the upper molars. Cingulum rather weakly developed. Crown area of cheek teeth unusually small in comparison with area of intervening palate, this feature alone sufficient to distinguish the species from any of the members of the genus with which it might be confused.

Measurements.—For measurements see tables, pages 204 and 205.

Specimens examined.—Total number 98, from the following localities:

ARGENTINA: Buenos Aires, 1 alc. (B. M.); Corrientes Province, Goya, 2 skins (B. M.); La Pampa Territory, Rio Colorado, 1 alc. (B. M.).

BOLIVIA: Rosario, 1 alc. (U.S.N.M.).

BRAZIL: Amazonas Province, Ega (=Teffe), 1 skin, immature (B. M.); Manaos, 1 skin (U.S.N.M.); Rio Grande do Sul, 1 alc. (B. M.).

BRITISH GUIANA: southern part, Ireng Valley, 1 alc. (B. M.).

COLOMBIA: Barbacoas, 2 skins (A. M. N. H.); Choco region, 2 alc. (B. M.).

COSTA RICA: Bebedero, 2 alc. (B. M.).
ECUADOR: Cachavi, 500 ft., 2 skins (B. M.); Mouth of Curaray River, 2 skins (A. M. N. H.); no exact locality, 1 alc. (B. M.).
NICARAGUA: Escondido River, 1 alc. (U.S.N.M.); Prinzapolka River, 2 alc. (U.S.N.M.); Rio San Juan, 1 alc. (U.S.N.M.).
PANAMA: Tabernilla, 2 alc. (U.S.N.M.).
PARAGUAY: Asuncion, 3 skins (F. M.); Paraguari, 2 skins (A. M. N. H.); Tacuaral, 24 skins, 16 alc. (U.S.N.M.), 7 skins (B. M.), 4 skins (M. C. Z.); no exact locality, 3 alc. (A. M. N. H.).
PERU: Pto. Indiana, R. Amazonas, 10 skins (A. M. N. H.).
VENEZUELA: Maracaibo, 1 alc., type of *Vespertilio mundus* H. Allen (A. N. S. P.); Rio Aurare, 1 skin (F. M.); Valencia, 1 skin (B. M.).

Remarks.—This species is at once recognizable among the South American members of the genus by its large foot, relatively short tail and tibia, globular brain case, short rostrum, and relatively weak teeth.

Geoffroy's *Vespertilio albescens*, based on Azara's "Chauve-souris douzième," is the first name given to this species. The animal is evidently common in Paraguay, where the late William Foster secured a large series of skins now distributed among various museums. In these skins, as made up by Foster, the necks are so stretched as to present a nearly bare area at the nape where the fur is thin, and this bare spot was at first supposed to be a specific character as compared with the condition in other *Myotis* (see Thomas, 1902). Throughout the wide range of the species there is very little variation in size or color; but, though the specimens from Paraguay are rather paler than those from farther north, particularly the series from eastern Ecuador, the latter can be matched by others quite as dark from Goya, Argentina, so that at present there seems to be no ground for subdividing the species. The specimens from Barbacoas, Colombia, were referred by J. A. Allen to his *Myotis punensis* (=*M. chiloënsis atacamensis*), which they superficially somewhat resemble.

Of the various names considered as synonyms of *Myotis albescens*, Wied's *V. leucogaster* was obviously applied to this species, as indicated by the excellent figure showing the characteristic chocolate-brown, pale-tipped fur, as well as the proportions of the forearm and legs. Temminck's *Vespertilio œnobarbus*, based on a specimen from an unknown locality in South America, is undoubtedly the same. Though the complete tooth formula could not be given, Temminck's figure shows the slender head and the long narrow tragus characteristic of *Myotis*, while the proportions of tail to total length and the description of the color correspond closely with those of *M. albescens*. The same author's description of *Vespertilio arsinoë* from Surinam, seems to apply also to *M. albescens*. It has a total of six molars and premolars in each jaw, the short thin pelage and pale-tipped hairs with clear white belly, and a forearm of about 33 mm., quite as in the latter species. The type was said by Dobson to be in the Leiden Museum. A fourth synonym is clearly *Vespertilio isidori* of D'Orbigny and Gervais (1847), based on a specimen from Corrientes, Argentina. It has the characteristic short tail in proportion to body (head and body 40 mm., tail 28) and a forearm of 33 mm.; the color is well described as of a brownish-black at the base of the hairs, which are pale yellow at the tips above, while the belly is whitish, the hairs brown basally, the membranes bare. To these synonyms is now added *Vespertilio mundus* H. Allen, the type of which, in alcohol, has been examined through the kindness of the Academy of Natural Sciences of Philadelphia, in whose collection it bears the number 1812. It is immature but clearly shows the distinctive characters of the species. That it is Harrison Allen's actual type is indicated not only by the locality (Maracaibo, Venezuela) but by the original parchment tag on which the number 5547 of the Smithsonian Institution can still be faintly traced.

External measurements of Myotis albescens

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Paraguay:													
Tacuaral	105655	♂	47.2	37.6	14.6	8.4	34.6	6.2	32.4	32.0	12.8	11.4	8.2
Do	105657	♂	48.8	31.4	15.0	7.6	34.6	6.0	31.2	31.0	12.0	10.0	7.4
Do	105658	♀	46.0	34.2	14.8	7.8	34.8	6.0	32.2	30.2	11.2	10.0	7.0
Do	105661	♂	44.6	36.0	15.6	7.4	34.8	6.0	33.2	32.2	12.0	9.0	7.4
Do	105662	♀	45.0	37.4	15.0	8.4	36.0	6.0	33.2	32.0	12.2	9.2	7.0
Do	105664	♀	47.2	35.2	14.8	7.8	36.0	5.6	33.2	31.4	12.4	9.6	7.6
Do	105666	♀	47.2	35.2	14.8	7.6	35.0	5.6	32.2	31.2	12.8	10.2	7.2
Bolivia: Rosario	238686	♀	47.5	32.0	13.5	7.6	36.0	6.0	33.0	31.0	12.5	12.0	8.0
Argentina: Rio Colorado	4.8.8.7 B.M.	♀	46.0	37.6	14.4	7.2	36.2	5.8	34.8	33.4	14.6	11.6	9.0
Brazil: Rio Grande do Sul	84.2.8.32	♂	45.0	34.6	14.6	7.2	36.0	6.0	34.0	31.8	13.4	10.8	8.2
British Guiana: Ireng Valley.	3.4.6.9	♂	44.2	34.4	15.0	7.8	33.8	5.4	31.8	30.0	12.8	11.4	7.4
Colombia:													
Condoto, Choco	14.5.28.32	♀	47.5	35.8	14.2	8.0	36.8	6.0	33.4	32.0	14.0	11.4	7.0
Do	14.5.28.33	♀	48.6	38.0	14.8	8.2	37.0	6.0	34.2	33.0	14.0	12.2	8.2
Panama:													
Tabernilla	144502	♂	50.4	35.0	15.4	8.6	37.4	6.0	35.0	32.4	14.6	11.0	8.8
Do	144503	♂	48.8	35.4	15.0	8.0	36.4	6.8	33.0	31.2	14.2	11.2	7.8
Costa Rica: Bebedero	95.8.17.20 B. M.	♂	50.0	35.0	15.2	8.2	36.4	6.2	33.8	32.2	13.6	10.0	7.2

Cranial measurements of Myotis albescens

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Paraguay:													
Asuncion	18216 F.M.	♀	13.6	12.8	----	3.8	7.2	5.0	10.7	5.0	5.3	5.7	1
Do	18217 F.M.	♀	13.5	12.5	8.0	4.0	7.0	5.2	9.7	4.7	5.2	5.1	0
Tacuaral	105562 U.S.N.M.	♂	13.0	12.2	----	3.2	6.2	4.8	8.9	4.8	5.2	5.1	0
Do	105661	♂	14.1	13.0	8.8	4.0	7.3	5.1	10.0	5.0	5.1	5.4	1
Do	105662	♀	14.0	13.2	9.0	4.2	7.6	5.5	10.4	5.2	5.3	5.4	2
Do	105664	♀	14.2	13.5	9.0	4.0	7.4	5.3	10.3	5.1	5.5	5.4	2
Do	1.8.1.39 B.M.	♀	13.8	12.8	8.5	3.9	7.2	5.1	10.0	5.1	5.4	5.5	1
Paraguari	23808 A.M N.H.	♀	14.2	13.1	----	4.0	7.2	5.4	10.1	5.0	5.5	5.4	0
Do	23809 A.M.N.H.	♀	14.2	13.5	8.8	4.0	7.2	5.5	10.3	5.1	5.3	5.4	1
Argentina:													
Goya	98.3.4.11 B.M.	♂	14.2	13.1	----	4.1	7.3	5.2	10.0	5.0	5.4	5.4	1
Do	98.3.4.12	♀	14.2	13.0	8.6	4.1	7.0	5.4	10.2	5.0	5.3	5.3	1
Ecuador: Cachavi	97.11.7.1	♂	14.0	13.0	----	3.8	7.0	----	10.4	5.1	5.5	5.5	2
Venezuela: Rio Aurare	18710 F.M.	♂	14.1	13.1	8.6	3.5	7.0	5.4	10.1	5.1	5.3	5.4	1
Colombia:													
Barbacoas	34241 A.M.N.H.	♂	13.9	13.2	8.5	3.8	6.7	5.2	10.2	5.0	5.4	5.5	0
Condoto, Choco	14.5.28.32 B.M.	♀	14.2	13.4	9.0	4.0	7.4	5.4	10.0	5.0	5.4	5.6	0
Bolivia: Rosario	238686	♀	13.2	12.6	8.0	4.0	7.2	5.2	9.6	4.8	5.0	5.0	0
Ecuador:													
Cachavi	97.11.7.1 B.M.	♂	14.0	13.0	----	3.8	7.0	----	10.4	5.1	5.5	5.5	2
Mouth of the Curaray	71644 A.M.N.H.	♂	13.8	12.8	----	3.8	7.0	5.2	10.0	5.0	5.6	5.6	0
Peru:													
Puerto Indiana	73233 A.M.N.H.	♀	13.8	12.8	8.8	3.6	7.0	5.0	9.6	5.0	5.6	5.2	0
Do	73234	♀	14.2	13.2	8.8	3.8	7.2	5.0	10.0	5.2	5.6	5.4	0
Do	73235	♀	14.0	13.0	----	3.8	7.0	5.0	10.0	5.2	5.4	5.6	0
Do	73237	♀	13.8	12.8	8.8	4.0	7.2	5.4	9.6	5.0	5.6	5.4	0
Do	73238	♀	13.6	12.8	8.6	4.4	7.0	5.2	9.8	5.0	5.4	5.2	0
Do	73239	♀	13.6	12.8	8.4	3.8	7.0	5.0	9.6	5.0	5.6	5.2	0
Do	73240	♀	13.6	13.0	----	4.0	6.8	5.0	9.8	5.0	5.4	5.2	0
Do	73242	♀	13.6	12.8	8.6	3.8	7.0	5.2	9.6	5.0	5.6	5.2	1
Costa Rica:													
Bebedero	95.8.17.20 B.M.	♂	14.4	13.4	8.8	3.6	7.0	5.2	10.0	5.2	5.4	5.5	0
Do	95.8.17.21	♀	14.0	13.0	----	3.6	6.8	5.0	10.0	5.0	5.4	5.6	0

MYOTIS SIMUS Thomas

Myotis simus THOMAS, Ann. and Mag. Nat. Hist., ser. 7, vol. 7, p. 541, June, 1901.—TROUESSART, Catal. Mamm. viv. foss., suppl., p. 95, 1904.—(Not OSGOOD, Field Mus. Nat. Hist., publ. 176, zool. ser., vol. 10, p. 182, April 20, 1914, =*Myotis nigricans*).

Type locality.—Sarayacu, on the Ucayali River, Loreto, eastern Peru.

Type specimen.—Female in alcohol, No. 81.5.12.2, British Museum (Natural History), collected at Sarayacu, Peru, in 1876 by W. Davis.

Distribution.—Amazonian drainage area of Ecuador, Peru, and Brazil. Range imperfectly known.

Diagnosis.—A small species about the size of *Myotis chiloënsis* but differing from all members of the genus known to occur in America by the following combination of characters: Wing membrane inserted at the ankle; ear small, its tip usually extending about halfway between eye and nostril when laid forward; fur of a peculiar dense woolly texture, the hairs on the back about 3.5 mm. in length; skull with unusually well-developed sagittal crest and broad anterior portion of rostrum; mandible unusually heavy; distance between upper canine and large premolar so reduced that the second small premolar is normally crowded inward behind cingulum of large premolar.

Ear.—The ear, as compared with that of *Myotis nigricans*, is smaller and more narrowed, especially in its upper half. Laid forward it extends halfway from eye to nostril as described by Thomas. We have examined skins only, and in two of these when thoroughly relaxed the conditions in this respect appear to be about as in the type. Tragus not noticeably different from that of *M. nigricans.*

Wing and membranes.—The wing membrane, so far as can be judged from relaxed skins, is unusually narrow at the level of the elbow; it is inserted at the ankle as in the North American *Myotis grisescens.* Third metacarpal falling short of elbow by about 4 mm.; fourth metacarpal usually a very little shorter than third; fifth obviously shorter than fourth and usually about 2 mm. shorter than third. Occasionally the fourth equals the third and in a few specimens the gradations from third to fourth and from fourth to fifth are equal. Membranes essentially naked throughout; on the basal portion of the uropatagium a few scattered hairs can be detected with the aid of a lens.

Foot.—The foot resembles that of *Myotis nigricans.* Calcar usually with a small keel. The ratio of foot to tibia in three specimens from Brazil averages 49.4. In the other material examined the proximal end of the tibia has been cut off.

Fur and color.—Fur everywhere short and woolly, without differences of texture on different parts of the body and with no long hairs on the back or elsewhere. At middle of back the hairs are about 3.5 mm. in length; those of belly are slightly shorter. The fur is strictly confined to the body, not extending out on any of the membranes. Two color phases are represented in the series of skins. The red phase is the more usual (13 out of 16 skins). In it the color is nearly the ochraceous-tawny of Ridgway, slightly paler, approaching yellow ocher on the underparts, the hairs without darker bases and without conspicuous gloss. In the brown phase the general color is nearly Mars-brown, the underparts with a slight ochraceous cast, the hairs of the posterior half of back with faintly contrasted paler tips which give to the fur a slight "watered" appearance. Ears and membranes in both phases blackish.

Skull.—The skull is about the same general size as that of *Myotis albescens*, the brain case is similarly high, and the rostrum short (as compared with *M. nigricans* and *M. chiloënsis*). But here the resemblance ceases. The brain case of *M. albescens* is unusually smooth, with at most a slightly indicated sagittal crest; that of *M. simus* is marked by better developed sagittal and lambdoid crests than any other known South American member of the genus. In *Myotis albescens* the rostrum tapers noticeably forward, so that the width across bases of canines is obviously less than the interorbital constriction; in *M. simus* the width across canines equals or exceeds the interorbital constriction (among 12 skulls it equals the constriction in 3 and exceeds it in 9). The mandible is conspicuously deeper than that of *Myotis albescens* and the angular process is more robust.

Teeth.—The teeth are in general more robust than those of *Myotis albescens*, in this respect about equaling those of *M. chiloënsis*. The canines, in particular, are larger than those of other South American species. In both the maxilla and mandible there is a tendency to crowding of the small premolars and reduction in the size of the second small tooth. This process is carried so far in the upper jaw that the second small tooth is usually hidden by the cingulum of the large premolar when the tooth row is viewed from the outer side. Though crowded, the second tooth is present in all of the specimens examined. Upper molars well characterized by the narrowness of the internal segment resulting from the small size and slight distinctness of the hypocone from the base of the somewhat unusually high protocone. Secondary cusps and ridges not well developed, the protoconule frequently absent or indistinct.

Measurements.—For measurements see tables, page 208.

Specimens examined.—Sixteen, from the following localities:

ECUADOR: Mouth of the Curaray River, 13 skins (A. M. N. H.).
BRAZIL: Rio Yuruá, Amazonas, 3 skins without skulls (B. M.).

Remarks.—*Myotis simus* is so different from all other known American species of *Myotis* that it can not be confused with any of them. Its short, woolly fur, small ears, and entirely naked membranes give it a superficial appearance which recalls some other genus: *Pipistrellus* or *Scotophilus*, Thomas suggested in the original description. Among the American members of the genus there is only one, the otherwise very different *Myotis grisescens* of southeastern United States, which shares with *M. simus* the peculiarity of having the wing membrane inserted at the ankle. Obviously, however, there is no specially close relationship between these two species, the cranial and dental characters of which differ widely from each other. The unusual breadth of the rostrum anteriorly differentiates *Myotis simus* among the South American members of the genus; in North America the same character is found in the otherwise very different *Myotis velifer* and *M. occultus*.

The peculiar quality of the fur in *Myotis simus* is a character which is unique among the known American members of the genus. The same may be said of the heavy mandible and unusually high sagittal crest, two characters which are probably correlated with each other and with the shortening of the tooth row as elements of a general strengthening of the chewing machine.

External measurements of Myotis simus

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
Brazil:													
Amazonas, Rio Yuruá	3. 10. 2. 1 B.M.	♂	52. 6	30. 2	17. 0	8. 0	39. 8	----	36. 0	34. 0	-----	----	----
Do	3. 10. 2. 2	----	52. 8	33. 8	16. 0	8. 0	39. 0	6. 6	35. 0	33. 0	-----	----	----
Do	3. 10. 2. 3	♀	44. 4	-----	15. 6	8. 0	39. 6	----	34. 2	32. 0	-----	----	----
Ecuador:													
Mouth of Curaray River	71484 A.M.N.H.	♀	-----	-----	-----	8. 0	-----	----	-----	-----	12. 0	8. 0	7. 2
Do	71489	♂	-----	-----	-----	8. 0	-----	----	-----	-----	11. 8	7. 2	7. 0

Cranial measurements of Myotis simus

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
Ecuador:													
Mouth of the Curaray	71483 A.M.N.H.	♂	14. 0	13. 2	9. 6	3. 8	7. 0	5. 0	10. 6	5. 2	6. 0	5. 8	0
Do	71486	♂	14. 6	13. 4	----	3. 8	7. 0	5. 2	10. 4	5. 4	6. 2	6. 0	0
Do	71488	♂	14. 0	13. 0	----	3. 8	6. 8	5. 0	10. 0	5. 2	6. 0	6. 0	0
Do	71489	♂	14. 2	13. 2	9. 2	3. 8	7. 0	5. 2	10. 4	5. 2	6. 0	6. 0	0
Do	71490	♂	14. 2	13. 0	----	4. 0	7. 0	5. 0	10. 2	5. 2	6. 0	5. 8	0
Do	71645	♂	14. 0	13. 0	----	3. 8	6. 6	5. 0	10. 2	5. 2	5. 8	6. 0	0
Do	71484	♀	13. 6	12. 6	----	3. 6	6. 8	4. 8	10. 0	5. 0	5. 8	5. 6	0
Do	71485	♀	13. 4	12. 6	----	3. 6	6. 6	5. 0	10. 0	5. 2	5. 8	5. 6	0
Do	71491	♀	13. 6	12. 8	----	3. 8	6. 6	5. 0	10. 0	5. 0	5. 8	5. 6	0
Do	71492	♀	13. 4	12. 4	----	3. 6	6. 8	5. 0	10. 0	5. 0	5. 8	5. 6	0
Do	71493	♀	13. 4	13. 0	----	3. 8	7. 0	5. 0	10. 2	5. 2	6. 0	5. 8	0
Do	71494	♀	14. 2	13. 0	----	3. 8	7. 0	5. 0	10. 2	5. 2	6. 0	5. 8	0

[MYOTIS PILOSUS (Peters)]

Vespertilio (*Leuconoë*) *pilosus* Peters, Monatsber. K. Akad. Wiss. Berlin, 1869, p. 403.

Vespertilio pilosus Dobson, Catal. Chiroptera Brit. Mus., p. 289, 1878.—Trouessart, Catal. Mamm. viv. foss., p. 124, 1897.

Myotis pilosus Trouessart, Catal. Mamm. viv. foss., suppl., p. 89, 1904.

Type locality.—Not certainly known.

Type specimen.—An adult female (in alcohol) formerly in the Muséum d'Histoire Naturelle at Paris.

Diagnosis.—A large species, characterized by the large foot and the fact that the wings arise from the tibia and from the middle of the back close to the spine; forearm 53 mm.

Description.—Dobson's description of the type specimen is as follows:

> Ears long, narrow, and shortly rounded off above; inner margin of the ear-conch straight above and below, concave in the middle, outer margin straight, slightly concave opposite the base of the tragus, and terminating in a short rounded lobe; tragus rather short and straight, obtusely pointed, inner margin straight, outer margin convex in lower three-fourths, straight above.

Wings from the middle of the tibiæ, *and from the sides of the back almost as close to the spine* as in *V[espertilio] macrotarsus* from the Philippine Islands. Interfemoral membrane triangular behind, last caudal vertebra free; calcaneum weak, concave behind.

Feet remarkably large, proportionally larger than in any other known species of the genus; the outer toe much shorter than the others.

Fur long and dense, extending thinly upon the upper surface of the interfemoral membrane as far as the end of the fourth caudal vertebra, and upon the legs to the ankles. Above, dark brown, with paler extremities; beneath a lighter shade of the same color.

First and second upper premolars minute, internal to the tooth row, but distinctly visible from without, the second very much smaller than the first; second lower premolar very small and quite internal, in the angle between the closely approximated first and third premolar.

Measurements.—The measurements of the type as given in the original description are as follows: Total length, 115; head, 23; height of ear, 19; anterior margin of ear, 17; breadth of ear, 9.5; tragus, 9; tail, 48; forearm, 53; thumb, 14; third metacarpal, 49; fifth metacarpal, 47.5; tibia, 20; foot, 20; calcar, about 22.

Remarks.—The type of *Vespertilio pilosus*, as we were informed by Mr. J. Berlioz of the Muséum d'Histoire Naturelle, through the kindness of the late Prof. E. L. Trouessart, is no longer in the Paris Museum, nor can any mention of it be discovered in the catalogue. The animal was supposed by Peters to have come from Montevideo, Uruguay, but its very obvious similarity to the large-footed Old World bats of the "*Leuconoë*," type and especially to the Philippine *Myotis macrotarsus*, with which it shares the peculiarity of having the wings attached high on the sides of the back, at once raises the suspicion that there was a mistake with regard to the locality, and that the specimen may have really come from somewhere in the East Indies, reaching the Paris Museum perhaps through the Verreaux brothers, notoriously careless in the labeling of the specimens which they offered for sale. Since a second specimen of the species has not been taken, either in America or in the Old World, it seems for the present best to include the animal here provisionally, pending the confirmation of the alleged locality through the capture of additional examples. That a bat of this kind should exist in South America and successfully elude capture for more than half a century can not be regarded as an impossibility in view of the remarkable history of such a conspicuous animal as *Pizonyx vivesi.*

III. THE SPECIES OF PIZONYX

PIZONYX VIVESI (Menegaux)

Myotis vivesi Menegaux, Bull. Mus. d'Hist. Nat. Paris, vol. 7, p. 323, 1901.—Elliot, Land and Sea Mamm. Middle Amer., Field Columb. Mus., publ. 95, zool. ser., vol. 4, p. 574, 1904.—Trouessart, Catal. Mamm. viv. foss., suppl., p. 94, 1904.—Elliot, Check List Mamm. North Amer., Field Columb. Mus., publ. 105, zool. ser., vol. 6, p. 474, 1905.

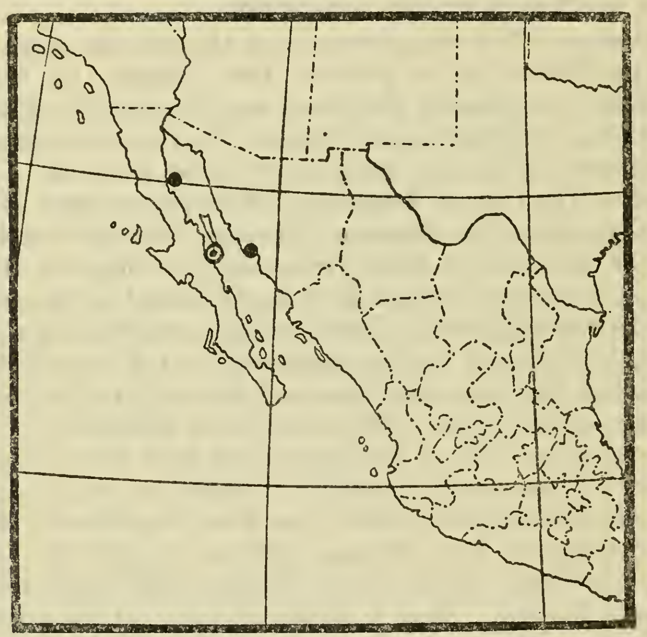
Pizonyx vivesi Miller, Proc. Biol. Soc. Washington, vol. 19, p. 85, June 4, 1906; List North Amer. Land Mamm. 1911, Bull. U. S. Nat. Mus., No. 79, p. 59, December 31, 1912; List North Amer. Recent Mamm. 1923, Bull. U. S. Nat. Mus., No. 128, p. 73, April 29, 1924.—McLellan, Journ. Mamm., vol. 8, p. 243, August 9, 1927.

Type locality.—Cardonal Island, Sal si Puedes Archipelago, off San Rafael Bay, Lower California, Mexico.

Cotypes.—Two females in alcohol. Both originally in Paris Museum; one now in British Museum.

Distribution.—Islands and coasts of the Gulf of California, Mexico.

Diagnosis.—Size and general appearance, apart from the enormously enlarged feet, essentially as in *Myotis myotis* of the palearctic region. Much larger than any known American *Myotis*, the forearm about 60 mm. in length.



Map 13.—Distribution of Pizonyx vivesi

Ear.—The ear is rather large; laid forward it extends about 5 mm. beyond the nostril. In general form it resembles the broad ear of *Myotis thysanodes* rather than the more narrow type seen in *M. velifer.* About eight faintly defined cross-ridges are usually visible. As compared with the ear of *M. thysanodes* the antitragus is relatively larger and the antero-basal lobe is relatively smaller. Tragus more bluntly pointed and relatively shorter than in *M. thysanodes*, its posterior margin finely but distinctly crenulate.

Wing and membranes.—Metacarpals conspicuously graduated by steps of about 5 mm., the fourth approximately equal to the forearm, and the third about 3 mm. longer. Wing membrane narrowed in a peculiar manner, so that when the wing is half extended the margin of the membrane behind the elbow extends in an approximately straight line from the tip of the fifth digit to the region about 15 mm. out from the knee; then it bends backward, rapidly approaching the tibia and finally arriving at its point of insertion on the dorsal surface of the outer side of the metatarsus. The result of this narrowing is that the lower leg is practically freed from the wing membrane, a condition strongly contrasted with that present in all the American species of *Myotis* (and in the large palearctic *Myotis myotis*), in which the border of the membrane in the half-flexed wing extends as a straight line from the fifth finger to the ankle or foot. The end of the tail projects beyond the general outline of the free border of the uropatagium, but a narrow margin of membrane extends practically to the extreme tip.

Foot.—The foot is remarkable for its very large size. In adults the claws can almost be hooked over the knee, while in half-grown individuals they extend considerably beyond the knee when the ankle is strongly flexed. The enlargement is not due to a uniform lengthening of all the elements of the foot, but to changes which chiefly involve the phalanges and claws. In an ordinary large-footed *Myotis* such as *M. thysanodes* the metatarsus is more than half as long as the combined phalanges and claws; in *Pizonyx vivesi* it is barely one third of this length. The lateral compression of the digits and claws seen in all species of *Myotis* is here carried to an extreme development. A few very fine hairs scattered over the surface of the foot can be detected with the aid of a lens. Calcar deepened and laterally compressed at its base, the area of its attachment to the heel assuming almost the character of a definite joint. Its length is about equal to that of the foot or tibia. It terminates indistinctly and bears no keel.

Fur and color.—The fur shows no special peculiarities. Longer hairs at middle of back about 8 mm. in length. It does not definitely extend out on any of the membranes. Uropatagium practically naked below except for a sprinkling of long loose hairs at its base and near the legs and a fine pubescence of minute silvery or yellowish brown hairs on its distal third; the upper surface has the same loosely sprinkled basal area and bare median region, but the distal third bears a thick growth of appressed backwardly directed hairs 3 to 5 mm. in length which form an almost furry coating. Color above nearly the wood brown or fawn color of Ridgway (1912), the hairs slaty at base; underparts whitish in strong contrast with the back, the hairs mostly without darker bases except those near wing membranes.

Skull.—The skull (pl. 1, p. 7, fig. 1) is immediately distinguishable from that of any American *Myotis* by its much greater size (total length about 22, while no American *Myotis* is yet known in which the skull ever attains a total length of 18 mm.). When compared with the skull of *Myotis velifer*, the species which most nearly approaches it in size (maximum total length 17.6), that of *Pizonyx vivesi* is seen to present some obvious peculiarities of form. The brain case is less elevated behind and less abruptly constricted anteriorly; its sagittal crest is low and inconspicuous. The longitudinal median groove on the rostrum is relatively deeper and better defined. When the skull is placed on a flat surface the alveolar line rises at a noticeably greater angle than in *Myotis velifer*, so that the tips of the high canines are elevated conspicuously above the surface on which the skull is resting instead of being brought almost in contact with it as is the case with the low canines of the smaller animal.

Teeth.—Apart from their greater size the teeth differ from those of the American species of *Myotis* in a general tendency toward heightening and slenderness of the cusps, a tendency which is especially noticeable in the canines and premolars. The height of the upper canine above alveolus is equal to decidedly more than the combined crown length of the four large cheek teeth, while in *Myotis velifer* it is as decidedly less than half this length. Both of the small premolars, mandibular as well as maxillary, are obviously heightened, and the second tooth in each pair exceeds the first both in height as seen from the side and in crown area as seen in apical view, a condition unknown in any American *Myotis*. In the mandible this heightening of the second premolar is so great that the profile of the entire row of cusp summits does not show the abrupt fall in front of the large premolar which is so characteristic of the cusp profile in ordinary *Myotis*. The incisors present no marked peculiarities. Molars normal in form; m^3 not reduced. All of the cusps share in the general tendency to heightening characteristic of the entire dentition, but this tendency is here less pronounced than it is in the canines and premolars. In m^1 and m^2 the small ridge which, in *Myotis*, extends from the base of the paracone to the protoconule usually runs to the protocone, leaving the very rudimentary protoconule, when present at all (usually absent), isolated on the margin of the crown. (Fig. 1*d*, p. 8.)

Measurements.—The measurements of the cotypes (both females) as noted by Miller in 1904 are as follows: Total length, 145 and 140; tail, 70 and 69; tibia, 24 and 24.6; foot, 23 and 23.8; longest claw, 10 and 10; forearm, 62 and 60; thumb, 12.2 and 12.6; claw of thumb. 2.4 and 3; second finger, 62 and 60; third finger, 120 and 120; fourth finger, 93 and 91; fifth finger, 88 and 85; ear from meatus, 24.6 and 25; ear from crown, 20.4 and 19; width of ear (flattened), 16 and 16; tragus, 11.8 and 11. For other measurements see tables, page 214.

Specimens examined.—Fourteen, from the following localities:

LOWER CALIFORNIA: Cardonal Island, Sal si Puedes Archipelago, 2 alc. (Paris; cotypes, examined by Miller in 1904), 3 alc. (A. M. N. H.); Isla Partida, about 12 miles north of Cardonal, 7 skinned from alc. (C. A.); Islas Encantadas, 1 skin (Dickey).

SONORA: Guaymas, 1 mummy (now in alcohol) (U.S.N.M.).

Remarks.—The striking peculiarities of *Pizonyx vivesi* render the animal one of the most easily recognizable of American bats. These peculiarities and more particularly the seemingly anomalous habitat and geographical range make it appear to be possible that this bat has some unusual mode of life. The original specimens were collected by Diguet, in December, 1900, under stones heaped up by the waves along the shore of Cardonal Island. Here the bats lived in company with a species of petrel (*Halocyptena microsoma* Coues). Diguet supposed that they fed on the excrement of the sea birds, but he presented no evidence in support of this seemingly improbable idea. The specimen in the United States National Museum was found February 23, 1904, completely desiccated, on the beach at Guaymas, Sonora, by the late William Palmer. The viscera had been destroyed by insects, so that no trace of the animal's food could be discovered. The digestive tract of the cotype in the British Museum was examined for us by Mr. Martin A. C. Hinton, who reports his inability to discover the slightest trace of food of any kind. That of the adult female topotype in the American Museum of Natural History was similarly explored by Mr. Remington Kellogg, of the United States Department of Agriculture. He found the stomach and intestines empty except for a few mites, some bat hairs, and one small feather. While we are thus left in complete ignorance as to the animal's food habits it seems not improbable that the enlarged foot and claws, the relative freedom of the leg from the wing membrane, and the elongation of the cusps of the teeth may all be associated with a diet consisting at least partly of fish. The resemblance of the leg, foot, and calcar to those of *Noctilio*, a bat which is well known to devour small fish,[19] is obvious.

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[19] For a recent account of *Noctilio's* piscatorialism see Benedict, Journ. Mamm., vol. 7, p. 58, Feb., 1926.

External measurements of Pizonyx vivesi

Locality	Number	Sex	Head and body	Tail	Tibia	Foot	Forearm	Thumb	Third metacarpal	Fifth metacarpal	Ear from meatus	Ear from crown	Width of ear
L. California:													
Cardonal Island	[1] Paris	♀	75.0	70.0	24.0	23.0	62	12.2	-----	-----	24.6	20.4	16
Do	[1] Paris	♀	71.0	69.0	24.6	23.8	60	12.6	-----	-----	25.0	19.0	16
Do	16802 A.M.N.H.	♀	74.4	74.8	25.0	23.8	63.0	10.4	65.2	56.2	24.2	20.4	15.0
Do	16803	[2] ♀	61.6	45.2	16.6	20.4	47.8	10.0	41.4	39.0	18.4	13.0	11.0
Do	16804	[2] ♂	52.4	32.6	13.0	19.4	35.0	9.2	27.0	26.2	14.4	11.6	9.0
Partida Island	4286 C. A.	♂	71.0	67.6	21.6	24.0	59.0	10.0	62.5	52.5	-----	-----	-----
Do	4295	♂	75.0	63.5	24.0	24.2	60.6	10.4	63.5	53.6	-----	-----	-----
Do	4296	♂	73.0	64.2	22.2	24.2	61.0	10.0	63.0	54.0	-----	-----	-----
Do	4285	♀	73.8	68.0	23.5	23.4	61.6	10.0	64.2	54.4	-----	-----	-----
Do	4292	♀	76.2	64.5	23.4	24.5	60.4	10.5	64.2	54.0	-----	-----	-----
Do	4293	♀	73.0	63.4	22.8	22.4	62.0	9.5	61.5	52.6	-----	-----	-----
Do	4294	♀	75.2	64.6	23.5	24.8	62.2	10.2	64.8	55.0	-----	-----	-----
Islas Encantadas	10263 Dickey	♂	"80"	"72"	23.8	24.0	59.4	10.0	63.4	53.6	-----	-----	-----
Sonora: Guaymas	123701	----	73.0	70	22.4	21.2	61.4	9.6	64.8	54.0	22.0	19.4	14.6

[1] Cotypes.

[2] Juvenile.

Cranial measurements of Pizonyx vivesi

Locality	Number	Sex	Greatest length	Condylobasal length	Zygomatic breadth	Interorbital constriction	Breadth of brain case	Occipital depth	Mandible	Maxillary tooth row	Maxillary breadth at m^3	Mandibular tooth row	Wear of teeth
L. California:													
Cardonal Island	[1] Paris	♀	22.0	20.4	14.4	6.0	10.8	7.6	17.4	9.4	----	10.0	?
Do	16802 A.M.N.H.	♀	22.0	20.6	14.6	5.6	10.2	7.2	17.0	9.0	9.0	9.6	0
Partida Island	9286 C. A.	♂	21.6	20.8	-----	5.6	10.0	7.2	16.8	9.0	8.8	10.2	0
Do	4295	♂	21.6	20.6	14.4	5.6	10.2	7.2	16.6	9.2	9.4	10.0	1
Do	9296	♂	21.2	20.2	14.2	5.6	10.2	7.2	16.2	9.4	9.2	9.8	1
Do	4285	♀	21.8	21.0	14.2	5.4	10.0	7.2	16.6	9.0	8.8	9.8	1
Do	4292	♀	21.6	20.4	-----	5.2	10.0	7.0	16.6	9.0	9.0	10.0	0
Do	4293	♀	21.0	20.0	-----	5.6	10.2	7.2	16.2	8.8	8.8	9.8	0
Do	4294	♀	21.8	21.0	14.0	5.6	10.4	7.0	16.8	9.0	9.2	10.0	0
Islas Encantadas	10263 Dickey	♂	-----	-----	-----	----	-----	----	-----	9.0	9.2	9.6	0
Sonora: Guaymas	123701	----	21.8	21.0	14.6	5.4	10.2	7.0	17.0	9.2	9.0	9.6	0

[1] Cotype.

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